Study Report 2008-05

# Program Evaluation for U.S. Army Lifelong Learning Centers (LLCs): Extension to Military Operational Specialty (MOS)-Based LLCs

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Lifelong Learning Centers (LLCs) are the physical instantiation of the Army Training and Doctrine Command's (TRADOC's) lifelong learning concept. Previous research by the Army Research Institute for the Behavioral and Social Sciences (ARI) established a framework for assessing the effectiveness of LLCs. The present investigation sought to examine the generalizability of the LLC Assessment Framework and to apply the framework to assessing the Fort Gordon LLC. This effort also examined the requirements for enabling LLC self-assessment. Some modification to the assessment framework was necessary to include external factors that moderate the relation between outputs and outcomes. The assessment of the Fort Gordon LLC revealed that, overall, the outputs necessary to achieve educational transformation and impact were produced by the LLC staff and affiliated stakeholders. It was determined that people knowledgeable of educational theory and technology and capable of having extensive face-to-face contact with LLC stakeholders will be necessary for LLC self-assessment. This report provides recommendations for leveraging the LLC capabilities and for addressing external factors such that future staffing and development decisions enhance the impact of the lifelong learning initiative.

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# Program Evaluation Metrics for U.S. Army Lifelong Learning Centers (LLCs): Extension to Military Operational Specialty (MOS)-Based LLCs

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## FOREWORD

As the Army's lead laboratory for research, development, and analysis on training and other human dimensions of operational performance, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is poised to address emerging topics as requested by Army organizations. One such emerging topic is lifelong learning, a concept adopted by the U.S. Army Training and Doctrine Command (TRADOC) to fundamentally change the timing and accessibility of Army schoolhouse training and education. ARI has supported the development of the lifelong learning concept by funding an initial investigation into the metrics necessary for assessing the effectiveness and impact of lifelong learning centers (LLCs), the physical instantiation of the lifelong learning concept.

The present research was conducted at the request of TRADOC's Training Development and Delivery Directorate to follow up the previous ARI-funded exploration of LLC assessment. The goal of the present effort was threefold: (1) to ensure that the LLC Assessment Framework initially developed would be broadly applicable across current and future LLCs that provide military operational specialty qualification education; (2) to conduct an assessment of the LLC implemented at Fort Gordon, GA; and (3) to draw up a plan for continued LLC self-assessment.

This final report presents in detail the research conducted and its findings. A revised LLC Assessment Framework is provided with the changes and their associated justifications documented. A narrative of the Fort Gordon LLC assessment method and findings is presented, as are recommendations strengthening the LLC in order to achieve optimal impact. Finally, a proposed plan for LLC self-assessment is provided along with a rationale for its design. Part of this work (the Fort Gordon LLC assessment findings) was presented to the Fort Gordon Directorate of Training in December 2007. The complete body of work will be presented to the next Council of Colonels to be held to discuss TRADOC's lifelong learning initiative.

MICHELLE SAMS, Ph.D.
Director

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## EXECUTIVE SUMMARY

Research Requirement:

The lifelong learning concept has been advanced as an Army-wide solution to the problem of meeting the educational demands of a rapidly changing operational environment. Lifelong learning is defined as "a mixture of traditional schoolhouse resident education with education presented in other locations at the individual's teachable moment" (TRADOC, 2004). Lifelong Learning Centers (LLCs) comprise a suite of technologies that enable, among other things, online posting of schoolhouse curriculum materials, courseware downloads, and distributed collaboration among users.

Previous research by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) established a process for assessing the effectiveness of LLCs in enhancing learning and readiness. The final report for that effort presented a comprehensive framework for conceptualizing how resources invested in LLCs could produce change to instruction, learning, and organizational effectiveness. The framework was used to conduct a formative assessment of a pilot LLC established at Fort Leavenworth to deliver leader education, which demonstrated that the framework was a feasible and useful tool for conducting LLC program evaluation.

The limited scope of the previous ARI effort, however, prevented an explicit test of the generalizability of the assessment framework. It remains to be determined whether the framework applies as expected to other LLCs, especially those that deliver military operational specialty (MOS) qualification instruction. New metrics and measures associated with the range of training and education strategies provided by LLCs, if required, must be developed. The present research sought to examine the generalizability of the LLC Assessment Framework and to apply the framework to conducting a formative assessment of the Fort Gordon LLC. This effort also investigated the requirements for enabling LLCs to conduct self-assessment such that the U.S. Army Training and Doctrine Command (TRADOC) could leverage ARI research to further the development of its lifelong learning initiative.

Procedure:

An in-depth set of interviews and focus groups were conducted with the large variety of stakeholders involved with the Fort Gordon LLC, a well-established MOS-based LLC and the prototype for the lifelong learning concept. The training and education strategies enabled by the Fort Gordon LLC represent the majority of learning strategies supported by other current and anticipated LLCs. The information gathered was used to determine the applicability of the assessment framework presented in Cianciolo (2007) and to make modifications to enhance generalizability where necessary. The revised framework was used to assess the learning effectiveness and readiness impact of the Fort Gordon LLC. Six aspects of the Fort Gordon LLC were examined: MOSQ Instruction, Assignment-Oriented Training, Simulations, Discussion Forums, Leader Education, and On-Demand Training. Assessment involved interviews, focus groups, classroom observations, system analysis, and archival data review where access to resources (e.g., operational units) for collecting data was limited. Requirements and methods for

conducting LLC self-assessment were determined via a combination of interviews, literature review, and examination of LLC assessment lessons learned.

Findings:

The LLC Assessment Framework proved to be largely generalizable across different types of LLCs, but some modification was necessary in order to reflect additional determinants of organizational impact. These additional determinants were factors external to the sphere of influence of the LLC, chiefly personnel management and institutional training procedures, which can moderate the relation between outputs and outcomes. Some modification also was made to metrics and measures in order to include more generalizable and usable methods for capturing LLC outcomes.

The assessment of the Fort Gordon LLC revealed that, overall, the outputs necessary to achieve educational transformation and impact (e.g., downloadable computer-based training products) were produced by the LLC staff and affiliated stakeholders. Where expected outputs were not observed, closer coordination between the LLC and stakeholders in the proponent schoolhouse appeared to be the necessary remedy. The link between outputs and outcomes was not readily observed in the present research effort. Larger organizational factors, such as Army policy regarding who may train which MOSs, played a role in limiting impact by preventing uniform access to instructional materials, reducing the time available to conduct training anytime, anywhere, and constraining the adaptivity of training systems to evolve in response to changing educational requirements.

Analysis of LLC self-assessment requirements indicated that assessment could not be readily automated. Rather, the evaluation process requires people knowledgeable of educational theory and technology and capable of having extensive face-to-face contact with LLC stakeholders within and outside of the schoolhouse. This requirement may be met by relatively minor modifications to current staffing levels at the program management level. Moreover, existing institutional resources may be leveraged to support the assessment process.

Utilization and Dissemination of Findings:

Assessing LLCs informs decision making by shedding light on the educational impact of financial investment in lifelong learning. The revised framework for LLC assessment reveals the factors outside of the immediate LLC context that can influence the link between the outputs of the initiative and the outcomes it achieves. In-depth assessment is necessary to demonstrate how existing investment and processes may be better leveraged to maximize the benefit of the dollars spent. Without assessment, decisions to save cost may needlessly reduce the effectiveness of education, which may in turn affect readiness and morale. The present research provides recommendations for leveraging the capabilities inherent in LLCs and for addressing external influences to success such that future staffing and development decisions enhance the impact of the lifelong learning initiative.

PROGRAM EVALUATION METRICS FOR U.S. ARMY LIFELONG LEARNING CENTERS: EXTENSION TO MOS-BASED LLCS

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# INTRODUCTION

> "Like many units, I suspect we received a lot of equipment that no one in the company had ever seen or used: Polish Mine Boots ... Talon Robots, civilian global positioning systems and laser range finders, Falcon View Mapping Software ... frequency jammers, and Polaris and John Deer all-terrain vehicles, to give a few examples." - MSG C. Peterson

The Soldiers in today's Army face unprecedented levels of complexity in their operating environment. The particular challenges of asymmetric warfare and counterinsurgency are well recognized and documented (e.g., *FM 3-24: Counterinsurgency*; see also Chiarelli & Michaelis, 2005; Williams, 2003), but as the above quotes from *Long Hard Road: NCO Experiences in Afghanistan and Iraq* (2007) illustrate, these challenges only partially represent the body of knowledge and skills that must be acquired to achieve success. The Army itself is rapidly changing, adopting new command, control, and communications technologies, new unit structures and personnel management practices, and new performance objectives. Moreover, the politically sensitive and highly public nature of actions taken by U.S. Soldiers significantly broadens the impact of mistakes. Consequently, Soldiers must develop the capability to execute more difficult tasks, more often, and under greater pressure.

The Army's institutional training and education system has changed in response to the demands of the modern operating environment. For instance, the Army Distance Learning Program (now called the Army Distributed Learning Program) was initiated in the 1990s to facilitate the participation of students outside the schoolhouse in standardized institutional education. The anticipated benefits of distance learning included an increased graduation rate, reduced course duration, enhanced personnel readiness status, and cost savings (Leonard, Winkler, Hove, Ettedgui, Shanley, Sollinger, 2001; Shanley, Leonard, & Winkler, 2001).

A limitation of the distance learning program, however, was that it was yoked to the institutional timeframe for updating and providing formal education. It enhanced the formal education process, but was not designed to address the learning needs of Soldiers outside of this context. Students continued to receive instruction in lock-step with career milestones rather than conducting training on an as-needed basis in response to rapid changes in the operational environment. A new approach was required to enable training and education that both met rigorous standards for content and instructional strategy and enabled the development of just-in-time competency throughout a Soldier's career.

## Overview of the Lifelong Learning Initiative

The U.S. Training and Doctrine Command's (TRADOC's) lifelong learning concept has emerged as this approach. Lifelong learning is defined as "a mixture of traditional schoolhouse resident education with education presented in other locations at the individual's teachable moment" (TRADOC, 2004). Simply stated, the purpose of the lifelong learning concept is to fundamentally change the way Soldiers interact with their proponent schoolhouse. Its intent is to enable anytime, anywhere access to institutionally approved learning content by leveraging information technology and advanced instructional strategies, including performance assessment and after action reviews (Wilson & Helms, 2003). Such access not only would benefit Soldiers,

but the schoolhouse as well, by linking the operating and generating forces in a rapid cycle of learning content development and distribution.

The seed for lifelong learning was planted at the U.S. Army Signal Center, located at Fort Gordon, GA, which sought to meet the training requirements of communications Soldiers whose equipment was updated far more frequently than formal education could be offered. The lifelong learning concept was later developed as an Army-wide solution to the problem of meeting the educational demands of a rapidly changing operational environment. The long-term vision for the lifelong learning initiative is to enable the delivery of anytime, anywhere instruction by all TRADOC schoolhouses.

Lifelong Learning Centers (LLCs) are the concrete instantiation of the lifelong learning concept, the portals through which globally distributed learners reach back to the institution. They provide web-based access to the instruction provided by the proponent schoolhouse. LLCs comprise a suite of technologies that enable, among other things, online posting of schoolhouse curriculum materials, courseware downloads, and distributed collaboration among users. In addition to the Fort Gordon LLC, several LLCs have been established at other schoolhouses, including the Command and General Staff College (Fort Leavenworth) and the Maneuver Support Center (Fort Leonard Wood), among others.

Currently, the technical management of LLCs occurs on site with the supported proponent. Future plans include consolidating technical management into one Enterprise LLC located at Fort Eustis, with supporting regional hubs on location with the original three LLCs (listed above) plus a few additional locations. Such integration is expected to reduce costs and facilitate management by centralizing technical support, content management, and user development (i.e., course developers, instructors, discussion facilitators, etc.). In concert with the evolving processes of technical management and instructional delivery, assessment strategies for capturing LLC effectiveness and impact also have developed (Cianciolo, 2007).

## Background of the Present Research

The present research follows from a previous ARI effort to explore metrics and methods for assessing LLCs (Cianciolo, 2007). Initial attempts by LLC program managers and staff to develop metrics for success focused on the activities conducted by LLC personnel (e.g., number of courses placed online) and other easily quantifiable data (e.g., number of students enrolled). Although such metrics were important reflections of personnel task execution, they did not address larger questions of interest to decision makers at the organizational level. Unanswered questions centered on the "so what?" of implementing LLCs. Did LLCs enhance the efficiency and effectiveness of instruction? Did they improve readiness? Did they reduce the costs of education? ARI sought to develop a generalizable framework for assessing LLCs that could be used to answer these questions. A secondary purpose of that investigation was to conduct a formative assessment of the pilot LLC established at the Command and General Staff College, Fort Leavenworth.

As reported in Cianciolo (2007), a combination of literature review, interaction with stakeholders, and data collection, was used to perform the research. Specifically, a

comprehensive literature review on the lifelong learning initiative (e.g., strategic plans, marketing literature, progress reports, etc.) was conducted, as was a review of the scientific and professional literature on technology-assisted instruction, program evaluation, and organizational behavior. Interviews and focus groups were conducted with a variety of stakeholders involved with the Fort Leavenworth LLC, including program managers and leadership, technical staff, instructors, course developers, and students. Where possible, input from people involved with the broader lifelong learning concept, such as representatives of the initiative's executive agent, also was collected. Following the literature review and interviews, surveys were administered to provide quantitative, representative data on the implementation and effectiveness of the Fort Leavenworth LLC. This research produced a comprehensive, generalizable framework for conceptualizing how resources invested in LLCs can produce change to instruction, learning, and organizational performance. The formative assessment of the Fort Leavenworth LLC demonstrated that the framework was a feasible and useful tool for conducting LLC program evaluation. Using the framework, the influence of the LLC technologies on instructional efficiency and effectiveness relative to other factors could be identified.

An important limitation of the initial LLC assessment research was that the design of the assessment framework was based on an unrepresentative sample of LLCs ($N = 1$, Fort Leavenworth). The small size of this sample prevented an explicit test of the generalizability of the LLC Assessment Framework. The purpose of the Fort Leavenworth LLC was to support the delivery of field grade leader education, but other LLCs were established (or have been conceptualized) to enable junior leader education, military operating specialty qualification (MOSQ) instruction, and/or military graduate-level education (e.g., judge advocate instruction). It therefore remains to be determined whether the framework applies as expected to these other LLCs, particularly those that deliver MOSQ instruction. Leader and advanced military education vice MOS-qualification instruction have different learner audiences and require different learning environments, instructional strategies, and performance assessment and feedback methods. Moreover, the instruction supported by MOS-based LLCs may have a more direct impact on mission readiness (e.g., through the just-in-time development or retraining of skills necessary to perform mission essential tasks) and potentially broader implications for cost savings (e.g., by using simulations as a substitute for expensive hands-on training equipment).

## Overview of the Present Research

The present research was sought by TRADOC in order to extend the findings of the previous ARI research and to leverage ARI support for continued development of the lifelong learning initiative. Its first objective was to examine the generalizability of the LLC Assessment Framework and to revise the framework to ensure its broad applicability. To meet this goal, the sample size of LLCs considered was expanded to two--the Fort Leavenworth LLC and the Fort Gordon LLC. Although still small, this sample size represented two-thirds of the population of well-established LLCs and addressed the distinct needs of MOS-based LLCs relative to LLCs focused on leader education. Selecting the Fort Gordon LLC also enabled detailed analysis of the broad range of training and education strategies that LLCs could offer, including simulation downloads and training on demand. The range of learning strategies featured in the Fort Gordon LLC was expected to represent the majority of strategies applied by current and future LLCs. An in-depth examination of the Fort Gordon LLC was conducted via interviews, literature review

(where applicable), and program analysis. The ways in which the assessment framework had to be modified to address the diverse needs of LLCs were identified and integrated into a revised framework.

The second objective of this research was to assess the effectiveness and impact of the Fort Gordon LLC. Six aspects of the Fort Gordon LLC were examined: MOSQ Instruction, Assignment-Oriented Training, Simulations, Discussion Forums, Leader Education, and On-Demand Training. Data were collected using a variety of methods, including interviews and focus groups, classroom observation, archival data analysis, and system analysis. Data collection alternatives to surveys were emphasized in order to explore the feasibility and utility of measures that limit demand on LLC users and stakeholders.

The third objective of this research was to explore the requirements of LLC self-assessment. This exploration was to include an investigation of the feasibility of automated data collection as well as the capabilities and number of required personnel and technologies. Requirements and methods for conducting LLC self-assessment were determined via a combination of interviews, literature review, and examination of LLC assessment lessons learned.

This final report documents the modifications made to the LLC Assessment Framework and presents the completely revised framework in Appendix B. Next, the assessment of the Fort Gordon LLC is presented, detailing the method and findings. Finally, recommendations for enabling LLC self-assessment and for conducting future LLC assessment research are provided. For readability purposes, this report was written in a modular format such that the text on each area covered (Assessment Framework Modifications, Fort Gordon LLC Assessment, and LLC Self-Assessment) may be read as a stand-alone document. The Conclusions section at the end of this report summarizes the report and makes recommendations for strengthening LLC assessment research.

## LLC ASSESSMENT FRAMEWORK MODIFICATIONS

There are several differences between MOS-based LLCs and LLCs based on leader education that have implications for how each type of LLC should be assessed. Every attempt to maximize the generalizability of the LLC Assessment Framework was made in the previous ARI research by including program-level stakeholders in the design process as well as high-level representatives of LLCs other than the one at Fort Leavenworth. An in-depth examination of the Fort Gordon LLC was conducted to put the generalizability of the assessment framework to the test. The Fort Gordon LLC was selected because it was the longest running LLC and because it provided a large variety of instruction that could be considered representative of the types of instruction most LLCs would offer (e.g., MOSQ instruction, simulation downloads, on-demand training, leader education, etc.). In this section, a brief review of the original LLC Assessment Framework is provided, followed by an overview of the Fort Gordon LLC and a detailed discussion of the revisions necessary to the original assessment framework based on the present research.

## The Original LLC Assessment Framework

The design of the original LLC Assessment Framework was based on the logic model approach to conducting program evaluation (McLaughlin & Jordan, 2004). Logic modeling links resources invested in a program to organizational impact through staff and stakeholder activities, program outputs, and anticipated outcomes at the individual and small group or community level. A logic model can be thought of as a "high-payoff target list" for conducting assessment. That is, the elements of a logic model are those assessment targets that must be captured in order to conduct an informative, diagnostic program evaluation. A logic model also may be thought of as a hypothesis or "qualitative causal model" of how a program achieves impact. Assessment results at the end of the causal chain (i.e., impact) may be explained by findings further up along the causal chain (e.g., effectiveness of staff activities, productivity). Logic models are commonly used for assessing programs that do not have simple return-on-investment metrics, such as social service interventions (e.g., parenting classes, health literacy initiatives), and may readily be adopted for non-profit educational initiatives.

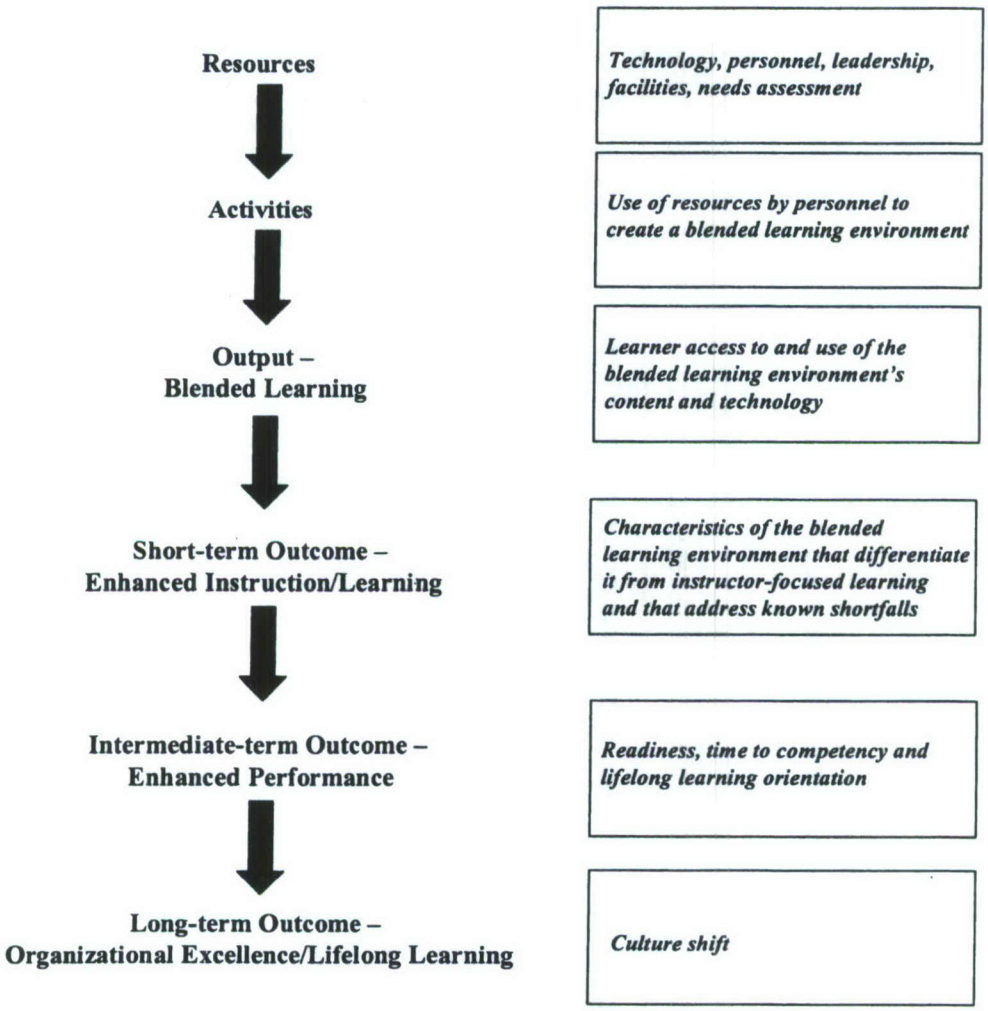


Figure 1. Logic Model for LLC Impact (from Cianciolo, 2007)

Figure 1 above shows the logic model presented in Cianciolo (2007). This logic model served as the architecture for the original LLC Assessment Framework. Briefly, *resources* were the investment of money, labor, facilities, and technology into an LLC. *Activities* were the use of resources by personnel to enable anytime, anywhere access to proponent learning content. The *output* of an LLC was represented by the access to and use of the portal and its contents by Soldiers. *Short-term*, *intermediate-term*, and *long-term outcomes* represented the instructional, individual, and organizational benefits achieved by providing anytime, anywhere access to proponent learning content. For a detailed breakdown of the logic model components into their constituent elements the reader is referred to Cianciolo (2007).

## Overview of the Fort Gordon LLC

The lifelong learning concept emerged from the conditions faced by signal Soldiers and leaders working in the contemporary operating environment. Specifically, the increased importance of communications personnel to mission success—combined with rapid changes to communication technologies and the side-by-side use of new and legacy systems—created a demand for more frequent, more rapid training (Farrell, 2001). For highly technical specialties, access to formal training not only was a function of room in the schoolhouse but also of the availability of equipment for hands-on training. Training requirements quickly outpaced the U.S. Army Signal Center's ability to provide in-house instruction, so a new way of doing business was required to meet the need. The lifelong learning concept provided this new business model (Wilson & Helms, 2003). The broad range of training and education strategies enabled by the Fort Gordon LLC represents a majority of the learning strategies adopted by other current and future LLCs, making the Fort Gordon LLC a useful testbed for evaluating the generalizability of the LLC Assessment Framework.

The Fort Gordon LLC was established in March, 2002 by the Signal Center Directorate of Training to implement the lifelong learning concept (Walton, 2003). The University of Information Technology (UIT), as the LLC was then known, began by providing a collaborative space and a variety of training products (e.g., equipment simulations) online via a central resource center or portal. This resource center enabled anytime, anywhere access to proponent schoolhouse content through individual workstations or the establishment of virtual campuses located throughout the world.

The early success of the UIT led to the Army-wide adoption of the lifelong learning concept (TRADOC, 2004), with the UIT serving as the first and model instantiation and becoming known as the Fort Gordon LLC. Additional pilot LLCs were launched at the Command and General Staff College at Fort Leavenworth and the Maneuver Support Center at Fort Leonard Wood, among other locations, as part of a TRADOC program to stand up LLCs at every proponent schoolhouse.

In late 2006 and in 2007, the mission of the Fort Gordon LLC expanded significantly, and has been folded into the larger LandWarNet eUniversity initiative. LandWarNet is the Army component of the Global Information Grid, providing Army-wide on-demand information collection, processing, storage, and dissemination. It consists of all of the Army's Department of Defense/Joint communications and computing systems and services, software, data security

services, and other associated services. The LandWarNet eUniversity, which is supported by Fort Gordon LLC staff, equipment, and affiliated personnel (e.g., training content developers), provides essential LandWarNet network training and knowledge management to non-signal Soldiers and to civilians who touch the network. Through the LandWarNet eUniversity the Fort Gordon LLC has an Army-wide impact on information technology education and training.

To manage the scope of the present analysis and to maintain consistency with previous research (i.e., Cianciolo, 2007), the LandWarNet eUniversity was not examined as a whole. Rather, focus was maintained on those aspects of LandWarNet eUniversity that reflected the generic LLC model adopted by other proponents. Each of these aspects, which represent the outputs of resource investment and staff activities, is described in detail below.

*LandWarNet eUniversity - Signal*

The LandWarNet eUniversity-Signal (eSignal) portal is the most direct reflection of the generic LLC model. That is, it features Blackboard™ as a central element for hosting standardized, approved proponent curriculum materials in a web-based environment that is accessible to learners (regardless of location) 24 hours a day, 7 days a week. Also consistent with the generic LLC model, eSignal provides one-stop access to online discussion forums. eSignal differs significantly from other LLCs in the nature of its instructional content and, by extension, its expected impact on mission readiness.

*Military operational specialty qualification (MOSQ) instruction.* In contrast to more "university-based" LLCs, such as the Fort Leavenworth LLC, which focus on leader education, eSignal primarily hosts military operational specialty qualification (MOSQ) instruction. As of the writing of this report, qualification courses for 20 MOS are hosted on Blackboard for learners in residence at Fort Gordon. eSignal also makes MOSQ instruction available to the Total Army. The qualification course for one MOS (25B10: Information Systems Operator - Analyst) is hosted in Blackboard for students in the Army Reserves, with 167 graduates to date. Learners in the Reserve Component participate in classroom-based MOSQ instruction at Regional High-Tech centers located in Sacramento, CA and Tobyhanna, PA. Additionally, a 25B10 pilot blended-learning course for Army National Guard Soldiers was conducted in 2005. Distance learning was provided to individual students and an abridged classroom component was held at the Professional Education Center located in Little Rock, AR.

Anytime, anywhere MOSQ instruction is expected to have a more direct impact on readiness than leader education for multiple reasons. First, MOSQ training addresses specific skills that constitute effective individual and collective performance in the field. Absence of these skills affects readiness by reducing the number of Soldiers in a unit who can carry out the unit's mission essential tasks. The absence of leader skills certainly impairs readiness, but the link between formal leader education and leader effectiveness in the field is subject to a greater number of moderating factors [i.e., acquisition and use of experience-based, or tacit knowledge (Tan & Libby, 1997; Wagner & Sternberg, 1985)].

Second, MOSQ instruction available "anywhere" enables Soldiers to learn independently of seats in the schoolhouse. Backlogs of students awaiting reserved seats in the schoolhouse

reduce readiness by decreasing the percentage of personnel in units who are qualified to perform their jobs (Cianciolo, 2007; Shanley, Leonard, & Winkler, 2001). Moreover, personnel who are not available to the unit because they are attending schoolhouse instruction (or because they are not yet MOS-qualified) reduce the training and mission readiness of the unit (Leonard et al., 2001). Such absences are a particular problem for the Reserve Component, which consistently has difficulty reaching optimal training status (Sortor, Lippiatt, Polich, & Crowley, 1994). Making MOSQ training available anywhere enables Soldiers to learn from home, from local technical centers, or from deployed locations, thus avoiding long-term absences from the unit.

The resident learning process may also benefit from anytime, anywhere education by enabling students to take greater responsibility for their own learning, to prepare better for classroom discussion and exercises, and to process course information in greater depth. Improvements in learning processes enabled by advanced technologies are expected to enhance readiness indirectly over the longer term, and have been discussed previously (Cianciolo, 2007), so they are not further elaborated here.

*Simulations*. Providing anytime, anywhere access to MOSQ instruction is not the only means by which eSignal (and other MOS-based LLCs) can have a direct impact on readiness. Equipment simulations hosted in eSignal support MOS sustainment and refresher training as well as just-in-time skill development. eSignal hosts several equipment simulations (e.g., AN/TSC-85/93, Joint Network Node, FBCB2, etc.), which are available as downloads to registered users who have common access cards. These simulations are enabled by advanced interactive multimedia instruction technologies that use a scaffolding approach to building procedural technical skills (Frank, G., Whiteford, B., Hubal, R., Sonker, P., Perkins, K., Arnold, P., et al., 2004). The simulations first assist learners in acquiring a skill by demonstrating each step of the procedural task along with text-based descriptions of the task. Next, learners practice the skill, receiving corrective feedback from the simulation when they make mistakes. Finally, learners validate their skills by executing a task in the simulation without feedback. The simulations produce a GO/NOGO report for learners to self-evaluate their proficiency (Frank et al., 2004).

*Technical discussion forums*. eSignal also hosts discussion forums to support rapid, horizontal information and knowledge sharing among communication professionals. The long-term vision for eSignal knowledge management is that it will serve as one-stop access to all communication-related discussion forums. As of 1 October 2007, eSignal hosts 40 technical forums (with 841 topics), in which signal Soldiers share information related to technical troubleshooting of the eSignal website, all aspects of communications equipment (e.g., setup, use, troubleshooting, maintenance, lessons learned, etc.), and the larger signal profession.

*LandWarNet Leaders Forum*

Currently supporting the Fort Gordon LLC's knowledge management component is the Battle Command Knowledge System (BCKS). BCKS hosts and manages the LandWarNet *Leaders Forum*, which is used by the Signal Center to provide early exposure to knowledge management and the use of BCKS during the Basic Officer Leadership Course (BOLC), the Basic Non-Commissioned Officer's Course (BNCOC), and the Advanced Non-Commissioned Officer's Course (ANCOC). The intent behind the *Leaders Forum* is to facilitate the

development of signal Soldiers into active participants in horizontal knowledge sharing and professional community growth throughout their careers. The *Leaders Forum* also provides easy access to other BCKS professional forums, including *NCO Net*, *PlatoonLeader* and *CompanyCommand*.

The *Leaders Forum* is not directly accessible through the eSignal portal. It is accessed through BCKS via Army Knowledge Online. Future plans include combining the eSignal and BCKS forums in order to provide one-stop knowledge management. In addition, external communications-related forums, to include the signal *Warrant Officers'* forum and the *53 Listserve* (for automation personnel), will be folded into the eSignal site. These plans are consistent with the recent integration of the Army's Directorate of Information Management portal for training, education, and knowledge sharing into the larger LandWarNet eUniversity.

*On-Demand Training*

On-Demand Training, enabled by online courseware delivery, makes MOSQ, sustainment, refresher, and just-in-time training available to signal units in the field. On-Demand Training may take the form of (1) mobile training teams (MTTs), which travel from the Signal Center to present tailored classroom instruction at remote locations by accessing content posted in the LLC; (2) virtual mobile training teams, which deliver special purpose instruction through the LLC to deployed units; and (3) unit universities, which enable remote, unit-based classroom instruction by accessing content posted in the LLC[1].

Importantly, On-Demand Training makes it possible to provide training where previously it was impossible or at least very difficult. The 24/7 availability of On-Demand Training enables Soldiers to develop critical skills independently of the institutional education cycle. Particularly in the case of technical skills, the requirement to enhance or refresh a Soldier's capability occurs several times between scheduled educational milestones. For instance, the refresh rate for communications equipment is approximately 18 months, but the span between formal training opportunities in the schoolhouse typically is six years. In this way, On-Demand Training supports the Army's apprenticeship model of training, in which the majority of learning occurs on the job. On-Demand Training provides the mentor to which Soldiers are apprenticed with up-to-date training content, advanced technology, and sound pedagogy.

As of the writing of this report, one MTT from Fort Gordon has been deployed to Fort Hood to conduct post-deployment 25U30 MOSQ instruction. One virtual mobile training team was assembled to assist a unit in Iraq with tearing down, moving, and setting up a new piece of satellite communications equipment. The short-course (videotaped demonstrations with instructors and manufacturer operation, equipment, and repair manuals) took the LLC staff two weeks to prepare with an estimated cost savings of greater than $400,000[2]. Forty-seven Unit

[1] Other components of the Fort Gordon LLC, including simulation downloads, the technical discussion forums, and non-resident 25B10 qualification instruction, may be considered on-demand training due to their independence from the schoolhouse. The distinction between these outputs of the LLC is made to clarify the discussion and later analyses of functionality and effectiveness.

[2] Estimated cost savings were presented by the Fort Gordon LLC in a VIP Brief on the Fort Gordon LLC, dated July 2007.

Universities have been established, up from seven in November of 2006. Ultimately, Unit Universities will be made available to all types of unit that have a signal element, which could number more than 600.

Mobile training teams (virtual or otherwise) are activated at the request and expense of a unit. To establish a Unit University, a unit commander or training manager (e.g., the battalion S3 or training NCO) contacts the LandWarNet eUniversity staff and requests access to particular MOS course material. If the requested MOS courseware is not among the 20 MOS course curricula already available on the LandWarNet eUniversity server, the LandWarNet staff procures the training by contacting the instructors who deliver the course at the Signal Center. Placing the courseware onto a website created for the requesting unit launches the Unit University with the sustainment training serving as the initial focus. Once a Unit University is established, users also have one-stop access to other features of the LandWarNet eUniversity, such as equipment simulation downloads.

## Modifications to Logic Model Components

Few modifications to the underlying logic model components of the LLC Assessment Framework were anticipated because the logic model used to create the framework was theory-based and designed to generalize across technology-assisted educational initiatives, both civilian and military (see Cianciolo, 2007). It was discovered through analysis of the Fort Gordon LLC, however, that some refinement to the logic model and its constituent elements was necessary to represent a more complete hypothesis of cause and effect with regard to LLC impact. The main drivers of change were (1) the realization that the timeframe of impact (short-term, intermediate-term, and long-term) was unrelated to the breadth of impact (individual, unit, organization); and (2) the discovery of external factors that moderate the link between LLC outputs and the expected outcomes. The revised LLC logic model is shown below in Figure 2.

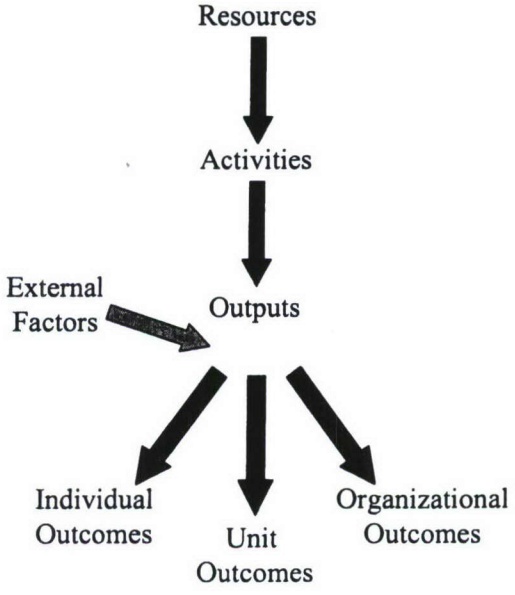


Figure 2. Revised LLC Logic Model

*Timeframe of Impact*

The Fort Gordon LLC's delivery of training outside the context of formal educational milestones (e.g., training on demand, simulation downloads), makes it possible to achieve individual outcomes during the short-term that were originally thought to occur during the intermediate-term (e.g., enhanced readiness). Outcomes thought to occur at the organizational level, over the long-term, may actually occur at the individual level (e.g., culture shift) or over the short-term (e.g., cost savings) as opportunities to provide just-in-time training arise. Given the generally limited scope of program assessments and the constantly changing nature of Army initiatives such as the Fort Gordon LLC, considering outcomes in terms of the timing of impact may draw attention to assessment targets that are not observable or particularly meaningful.

A more apt categorization of outcomes discriminates between individual, unit, and organizational outcomes, rather than short-term, intermediate-term, and long-term outcomes.

- *Individual outcomes* are those changes in learner behavior and capability accomplished via technology-assisted instruction, training on demand, and associated enhancements to instructional efficiency and effectiveness.
- *Unit outcomes* are those changes in unit effectiveness enabled by anytime, anywhere access to proponent learning content.
- *Organizational outcomes* are those changes to organizational functioning at the classroom, proponent, and Army level accomplished via lifelong learning.

*External Factors*

As the diversity of an LLC's educational offerings increases, and the breadth of outreach expands, the opportunity arises for external factors outside the direct sphere of influence of the LLC to play a role in achieving impact. In these cases, organizational readiness factors, which are commonly recognized to influence the effectiveness of educational initiatives (e.g., Dean, Biner, & Coenen, 1996; Salas, Rhodenizer, & Bowers, 2000; Leonard, Winkler, Hove, et al., 2001), become even more important determinants of success. The requirement for coordination with external actors is especially strong in a case such as the Fort Gordon LLC, where impact depends on the actions of others who do not work within the same hierarchy or reward structures. Examples of external factors influencing LLC effectiveness include (but are not limited to) (1) the duration of the institutional curriculum development cycle; (2) the availability of computing facilities located on post to support blended resident instruction; (3) the incentive program for engaging in required at-home learning; and (4) Army policy regarding who can teach what qualification courses. The actors who could influence these factors range widely from unit commanders, to human resource managers, to Army-level plans and operations personnel.

External factors were not represented in the original logic model because they were considered outside of the sphere of influence of the LLC initiative. However, they do play a critical role in enabling success and therefore should be recognized in an LLC assessment effort. Failure to account for external factors would prevent a comprehensive understanding at the program and Army level of how resources must be leveraged or processes enhanced to maximize impact. As an analogy, the lifelong learning concept has been considered in this research

program to be the main effort, but its success is determined by the actions of its supporting efforts. If the commander is unaware of how supporting effort activity influences the success of the main effort, he lacks the critical information he needs to ensure mission success.

Table 1 below presents the revised logic model elements list. As with the original LLC logic model, each element is tied to an element category and a logic model component.

Table 1. Components and Associated Elements in the Revised LLC Logic Model

| | |
|---|---|
| Resources | Money<br>o Costs directly and indirectly attributable to delivering proponent courses (resident, non-resident, and simulation-supported), including technical staff costs<br>o Costs directly and indirectly attributable to delivering training on demand<br>o Costs directly and indirectly attributable to implementing discussion forums<br>Personnel<br>o Leadership, technical staff, course developers, courseware producers, and instructors<br>Fixed Assets<br>o Technology, equipment, supplies, and facilities used to develop, implement, and maintain LLCs and to provide proponent learning content |
| Activities | Technical Staff<br>o Setup, integrate, customize, and manage LLC components<br>o Migrate course content across LLC components<br>o Provide training to instructors, curriculum developers, and other users on the LLC components<br>o Provide technical support to students, faculty, curriculum developers, and other users<br>o Provide support for answering Field Army users' operational questions<br>Curriculum Developers<br>o Collaboratively generate course content using LLC applications<br>o Lead the development of standard operating procedures (SOPs) for leveraging the capabilities of the LLC components<br>o Mentor late adopters on system functionalities to enhance course development<br>Instructors<br>o Deliver curriculum materials by posting them in the LLC<br>o Customize course content based on student feedback and access to other resources (e.g., Army Knowledge Management)<br>o Perform course administrative duties<br>o Evaluate student progress and report grades to school administrators<br>o Lead the development of SOPs for leveraging system capabilities<br>o Mentor late adopters on application functionalities to enhance course instruction<br>CBT/WBT Courseware Production Team<br>o Maintain project teams to perform CBT/WBT analysis, design, development, implementation, maintenance, and validation<br>o Provide contractual, technical, and educational/quality oversight of contractor-developed CBT/WBT<br>o Maintain a database of CBT/WBT technologies, capabilities, and techniques<br>Leadership<br>o Provide and communicate vision<br>o Initiate and oversee user and stakeholder needs assessment<br>o Market the LLC concept to stakeholders<br>o Procure resources to maintain/update the LLC, oversee operations, prioritize limited resources across LLC functions<br>o Initiate/organize the development of SOPs for leveraging system capabilities |
| Outputs | 24/7 Uniform Access<br>o Access to the system<br>o Actual use of the system |

| | |
|---|---|
| | Computer-/Web-based courseware for delivering proponent courses<br>o Courseware that is readily available to meet course needs |
| External Factors | Culture<br>o Unit commander support of/emphasis on informal education<br>Resources<br>o Time available for learners to conduct studies in the context of other work<br>o Fiscal incentives available for learners to conduct studies at home<br>o Technology and procedures available to track individual learners<br>o Contracting cycle<br>o Computing facilities<br>Policies<br>o Army-level policy supporting anytime/anywhere learning<br>o Army-level policy supporting rapid course updates |
| Outcomes (Individual) | Improved Student Performance<br>o Enhanced higher-order thinking<br>o Enhanced skill development<br>o Enhanced reflective capability<br>o Enhanced learner independence and responsibility<br>o Enhanced learning self-efficacy<br>o Enhanced motivation<br>Adoption of Lifelong Learning Orientation<br>o Distal motivation to engage in opportunities to learn<br>o Enhanced collaboration orientation<br>o Internalization of anytime, anywhere learning<br>Enhanced Mission Readiness<br>o Just-in-time competency<br>o Enhanced skill retention<br>o Enhanced (affective) organizational commitment<br>o Enhanced socialization in organizational goals and values<br>o Reduction in work-education-Family conflict |
| Outcomes (Unit) | Enhanced Mission Readiness<br>o Enhanced unit status reporting<br>o Reduced time to optimal training status<br>o Enhanced MOSQ training status<br>o Enhanced collective training |
| Outcomes (Organization) | Improved Teaching and Learning Environment<br>o Enhanced relevance of training and educational content<br>o Enhanced instructional efficiency<br>o Instructor as a facilitator of adult learning<br>o Presence of a learning community<br>o Advanced CBT/WBT courseware for distributed/distance learning<br>Enhanced Educational Cost-Effectiveness<br>o Enhanced cost-outreach<br>o Enhanced throughput effectiveness<br>o Reduced recycle rate<br>o Enhanced CBT/WBT courseware development cost-effectiveness<br>o Reduced the range equipment/supplies requirements |

## Modifications to Metrics

As with the LLC logic model, relatively little modification to metrics was anticipated. Where modifications were anticipated, they were expected to involve additions to outcomes in order to reflect the unique ways in which MOS-based LLCs enhance readiness at the unit level. In fact, several metrics were added. In general, metrics were added in order to better represent

the resources, activities, outputs, and outcomes associated with providing learning opportunities other than course instruction (i.e., simulation downloads, discussion forums, and training on demand). Although the original LLC Assessment Framework accounted for the different types of learner reached by the Fort Leavenworth and Fort Gordon LLCs, the framework did not account for the diverse range of instructional methods possible. The complete set of metrics for the revised LLC Assessment Framework is shown in Appendix B.

## Modifications to Measures

Some modification to measures was anticipated. Primarily, it was expected that modifications would include (1) the addition of measurement methods that could serve as feasible alternatives to surveys; (2) the modification of existing measures to make them more general across LLCs (i.e., not tied to a specific mode of course delivery or type of curriculum); (3) the addition of measures to address the broader range of assessment opportunities enabled by the diverse outputs of different types of LLC; and (4) the addition of measures to address the creation of new metrics, where applicable. All of these anticipated modifications were made.

First, interviews and focus groups were added as feasible alternatives to surveys. These measurement methods provide significantly more diagnostic information than do surveys and permit approximately the same sample representativeness as surveys in certain cases (i.e., when participants are not located at the schoolhouse), given the relatively low response rate to surveys by LLC users in the field. The decision to use surveys versus focus groups should be based on the diversity and accessibility of the population to be sampled, as well as the purpose of the information (developmental or sampling) to be acquired through the research process.

Second, some measures were modified or added to enable more generic methods of assessing student performance and more broadly applicable measures of resources. For instance, financial data may not be available in some cases, so reasonable methods for estimating costs must be specified. The revised measures support this estimation process. In addition, where special purpose measures were listed explicitly in the original assessment framework (e.g., the 1009 form used by the Command and General Staff College to assess higher-order thinking), more generic forms of assessment were supplied. The type of instruction to which measures could be applied also was specified in a way that would be more user friendly and generalizable across LLCs. Rather than specifying the mode of instruction (i.e., distributed-collaborative, resident, etc.), the appropriate LLC output was specified (e.g., leader education, MOSQ instruction, On-Demand Training, etc.). This specification may help users of the revised framework to more quickly determine the metrics and measures that apply to their particular LLC.

Third, archival materials, such as programs of instruction and course crosswalks (comparing resident to distance learning), were identified as additional measures for several metrics. Such measures draw the attention of assessors who are relatively new to the Army training system to the possibility of cost-effective, informative alternatives to novel data collection. Additional measures not explicitly mentioned in the assessment framework include previous scientific and institutional studies. As is demonstrated in the Fort Gordon LLC assessment below, the analysis of previous research provided valuable supporting information.

Historical documents cannot be directly linked to any one type of metric[3], however, so they were not included, but should be explored by future assessors.

Finally, measures were added to address the new metrics. Refer to Appendix B for the complete, revised LLC Assessment Framework.

## ASSESSMENT OF THE FORT GORDON LLC

This section presents the assessment of the Fort Gordon LLC. Six aspects of the Fort Gordon LLC were assessed: (1) MOSQ Instruction; (2) Assignment-Oriented Training; (3) Simulations; (4) Discussion Forums; (5) Leader Education; and (6) On-Demand Training. For each aspect assessed, the discussion is organized as follows:

- The Sample
- Assessment Questions & Method
- Summary of Findings
- Detailed Findings
- Recommendations

The Fort Gordon LLC is wide ranging, with 20 MOSQ courses posted online, 46 Unit Universities, and well over 100 simulation and courseware downloads. The limited scope and duration of the present assessment effort necessitated that only a sample of each of the components of LLC be selected for analysis. This sample was chosen based on seniority (e.g., courses that were among the first to be hosted on the LLC were selected) and on input from project stakeholders at the Signal Center Directorate of Training. In most cases, the sample involved in data collection was representative (if not the population itself). Where the sample may not be representative, caveats are provided. The investigation presented below does not feature controlled scientific experimentation, but rather reflects the attempt to explore causality using a qualitative (logic) model in a naturalistic organizational setting. Quantitative data were collected everywhere possible and presented in table format, but both summarized and detailed findings are provided in narrative format due to the complex and somewhat qualitative nature of the research.

It should be noted that the Fort Gordon LLC is rapidly changing such that the assessment results presented here reflect a historical snapshot of LLC functioning. For example, the curriculum for the Signal Captains' Career Course, assessed as part of this investigation, recently underwent significant change in order to standardize the content of the Active and Reserve Component courses. The majority of the Signal Captains' Career Course students interviewed had begun the course using the previous format, completing it under the new format. A small number of the Unit Universities initially selected for examination could not be assessed because the units themselves were deactivated. The *Leaders Forum* staff acquired direct BCKS assistance during the course of the research effort, and is in the process of developing near-term plans for

[3] The presence of these documents is not systematic, although their most likely focus is organizational impact, such as cost savings, learning effectiveness, and readiness enhancement. Most commonly, these studies are authored by government and federally funded research institutions, including the TRADOC Analysis Center, RAND Corporation, and ARI.

significant changes to the organization of forums. In each section below, an attempt has been made to document the implications of rapid change for interpreting the assessment findings. Continuous assessment would be necessary to ensure that the need for and impact of change is tracked.

## Assessment of MOSQ Instruction

### *The Sample – 25B10*

To fully study the impact of the Fort Gordon LLC on MOSQ instruction, a course had to be selected such that the effects of the LLC on delivering and administering instruction could be examined. As described in Cianciolo (2007), educational technology may transform the classroom experience both by how it is used to convey curriculum materials during class time and by how it is used to conduct administrative activities outside the classroom. The lack of computer lab facilities at Fort Gordon prevents anytime, anywhere access to course materials by many resident students, so the Fort Gordon LLC currently is not being used to conduct such administrative activities as assigning or collecting homework, posting announcements, or sharing course content among resident students. The non-resident student and/or instructor experience with accessing and using LLC technologies from a distance therefore was the only such experience that could be examined. Examining a course that provides resident and non-resident instruction also was necessary to determine whether the LLC enabled standardization and increased outreach of proponent curriculum materials. Increased outreach is a critical mechanism by which the cost per student of a course is reduced. At the time the present research was conducted, the 25B10 course was the only MOSQ course offered in both resident and non-resident format using the Fort Gordon LLC technologies (i.e., Blackboard). For this reason, the 25B10 course was selected for analysis and a sample size of one equals the population.

The 25B10 course provides instruction for "entry-level" (Skill Level 1) information systems operator-analysts. The course lasts approximately 19 weeks, and is segmented into 18 annexes, covering such topics as information assurance, network essentials, troubleshooting and repair, routers and switches, basic operations of various commercial off-the-shelf applications (e.g., Microsoft Outlook, UNIX, and SOLARIS operating systems), and basic operations of proprietary tactical equipment (i.e., selected components of the Army Battle Command System). Annexes comprise lectures, demonstrations, simulations, and hands-on training in different sequences depending on the annex. The 25B10 non-resident course is offered to students in the Reserve Component via High-Tech Regional Centers, where students may come together for lectures and hands-on training. Curriculum materials (e.g., lecture slides) also may be accessed remotely by non-resident students via Blackboard.

### *Assessment Questions & Method*

The analysis of MOSQ instruction assessed the processes and outcomes associated with delivering the 25B10 course to resident and non-resident learners via the Fort Gordon LLC. Specifically, the following questions were asked and associated metrics used to focus data collection:

- Question: Does delivering 25B10 using Blackboard enhance course relevance?
  - Metric: Estimated frequency of instructor augmentation to standardized course curriculum relative to pre-LLC situations
- Question: Does using Blackboard to administer the 25B10 course in residence enhance instructional efficiency?
  - Metric: Estimated % reduction in time spent in classroom doing administrative tasks, including announcements, handouts, and testing using LLC
  - Metric: Estimated % increase in time available to assist students having difficulties
- Question: What are the cost savings associated with administering 25B10 online?
  - Metric: Estimated % reduction in cost-per-student with LLC versus prior to LLC implementation
  - Metric: % reduction in travel, housing, and student pay expenses
- Question: Does administering the 25B10 course online enable uniform access to training content?
  - Metric: % curriculum materials found in Blackboard that are common across user locations

The above metrics were partially captured via a series of interviews and a focus group. Specifically, the Division Chief of 25B resident instruction was interviewed, as were the former Fort Gordon LLC Program Manager, the head instructors for the non-resident 25B10 course administered at two Reserve Component High-Tech Regional Centers (Tobyhanna, PA and Sacramento, CA) and at the Army National Guard Professional Education Center located in Little Rock, AR. A focus group was conducted with three resident 25B10 instructors and the Deputy Division Chief of 25B resident instruction. The interviews and focus group were conducted as an alternative to surveys for assessing instructor activities and impressions. Archival materials also were examined, including the 25B10 program of instruction, the 25B10 non-resident curriculum materials, and a cost-savings analysis of a pilot non-resident 25B10 course conducted at the Army National Guard Professional Education Center.

*Summary of Findings*

In the case of 25B10, analysis of activities and outputs indicated that there was great potential for online course delivery via the Fort Gordon LLC to enhance the outreach, administration, standardization, currency, and cost-effectiveness of MOSQ instruction. The LLC technical staff performed the activities required to post curriculum materials online, creating three 25B10 Blackboard sites that enabled students in both the Reserves and National Guard to earn MOS-qualification without the obligation to leave their units or families and incur the related travel, lodging, and duty pay costs associated with resident instruction. Blackboard sites for the resident 25B10 course allowed instructors to present course materials independently of classroom arrangements. Moreover, administering exams via Blackboard allowed instructors to reduce significantly the amount of time spent administering exams and to use the additional time for remedial instruction. The LLC help desk provided assistance to course developers and instructors upon request.

Linking the online delivery of 25B10 materials to fully realized benefits, however, was not a straightforward matter due to factors outside the sphere of influence of the Fort Gordon LLC technical staff and the Signal Center Directorate of Training. These factors included (1) the length of the curriculum review and revision process for programs of instruction; (2) lack of public computing facilities at Fort Gordon; and (3) Army-level restrictions on who may teach MOSQ courses.

The length of the curriculum review process made it very difficult for LLCs to facilitate meaningful change to institutional curriculum content. Although some modification could be made without being subject to the institutional review process, the nature of such change was superficial. Substantive updates to address new equipment or equipment versions could not be approved or resourced without formal review. Moreover, instructor access to Blackboard sites was restricted such that content edits or augmentation had to be made through course developers. This restriction ensured standardization, but limited instructor participation in enhancing course currency. Lack of public computing facilities limited student access to course materials outside of the classroom, making optimal use of class time difficult to achieve for resident instructors. Without common access to computers after hours, course administration had to remain a classroom activity. Army-level restrictions on who may teach MOSQ courses prevented the broad implementation of non-resident 25B10 instruction hosted via the LLC and the associated cost savings.

Some modification to internal processes would have facilitated the use of Blackboard to enhance instructional efficiency and to enable uniform access to course content. Different programs of instruction were used in all three of the 25B10 courses analyzed (resident, non-resident/Tobyhanna, and non-resident/Sacramento), in part due to lags in larger training processes or schedules but also due in part to lack of coordination among the managers of resident instruction and the LLC staff. Ensuring standardization was not viewed as a role for the LLC staff (rather, this role was to post content as requested) or the resident instruction managers (rather, communication outside the schoolhouse was handled by the Army's Automated Systems Approach to Training personnel). Similarly, the relative roles of the LLC staff and resident instruction managers in ensuring that instructors were facile with technology-assisted instruction and Blackboard features were undefined. More tightly integrated roles, guided by a systems perspective on producing educational change, were necessary to sustain the momentum of proactive individuals who leveraged the capability of LLC technologies.

*Detailed Findings*

*Course relevance.* Army training and education courses go through a lengthy review process prior to substantive changes being made to the program of instruction. Substantive changes are those changes that lead to new requirements for resources, such as hands-on training equipment, simulation-based courseware, time, and personnel. Substantive changes may include the introduction/removal of a topic area or the addition/deletion of content to an existing topic area (such that the required number of hours for instruction changes). The resources necessary to meet the new requirements are not provided by the Training and Doctrine Command until the revised program of instruction has been reviewed and approved. The review process takes approximately three years, a timeframe that lags behind communications equipment

modifications. Because substantive changes to a curriculum are subject to the institutional review process, the LLC may help to address this lag if it is used by instructors and/or course developers to rapidly make minor revisions to course content or to disseminate new information or downloads that students could access during time not used for classroom instruction.

The three 25B10 instructors and the Deputy Division Chief of 25B resident instruction, who participated in the focus group, indicated that approximately 30% of a lesson plan may be changed without requiring the lengthy institutional review process. These changes include corrections to typos and other errors in the lecture slides as well as relatively minor revisions of content. For example, slides could be added to a lecture to reflect a change in equipment functionality or the presentation strategies within a lecture could be modified such that a more multimedia approach is used. Focus group participants reported that they were not allowed to make such changes themselves (i.e., they had read-only access to Blackboard), but were required to work with course developers who have administrative access to curriculum materials. Access restrictions were built into the curriculum management process to ensure the quality control and standardization of course materials. Moreover, public access to computers outside of the classroom was not widely available for resident students, so the Fort Gordon LLC was not used to distribute extracurricular materials. For these reasons, focus group participants did not report engaging in active modification of course content.

To the extent that the sample of instructors interviewed was representative and reporting was accurate, the Fort Gordon LLC appears to have had relatively little impact on enabling enhanced relevance of MOSQ training content such that MOSQ instruction optimally meets the readiness requirements of field units. Online posting of institutional course content can strengthen the tie between the non-resident curriculum and the needs of the Army as reflected in the proponent's priorities for instruction. However, the critical changes that must be made to address the lag between curriculum revision and equipment updates are largely beyond the sphere of influence of the LLC, requiring modification to the curriculum development and resourcing process more so than implementation of advanced training delivery technologies. Such technologies are most effective for standardizing course currency across resident and non-resident learners or providing up-to-date content that is not tied to a particular institutional course. This finding is consistent with Cianciolo (2007).

It should be noted that the adoption of new communications equipment by field units also lags behind the release cycles of equipment modifications or replacements. The educational and readiness costs associated with curriculum lag are unknown because the degree of mismatch between training content and fielded equipment is undocumented. The Fort Gordon LLC may better address readiness shortfalls resulting from curriculum lag by providing training on demand rather than by attempting to change institutional processes.

*Instructional efficiency.* Instructional efficiency is enhanced by technology when it is used to reduce the amount of classroom time spent on non-teaching activities and increases instructor time spent on tailoring the learning experience to the needs of a particular class or particular individuals (e.g., Bourne, 1998). Focus group participants ($N = 3$ 25B10 instructors and the Deputy Division Chief of 25B) reported that there was relatively little reduction in classroom administration time enabled by hosting 25B10 course content online in Blackboard.

The reason they provided was that resident 25B10 students do not have uniform access to computing facilities outside of the classroom. They stated that announcements, homework assignments, and other materials posted online would not be accessible to most students, so class time was used for course administration instead. In addition, they noted that the 25B10 course has very few group assignments, which students use face-to-face time to complete. Non-resident instructors at the High-Tech Regional Centers reported not conducting online course administration for similar reasons.

Focus group participants did indicate, however, that using Blackboard could vastly simplify the administration of quizzes and exams, which would in turn allow them to make better use of class time. They reported that students took all quizzes and most exams in Blackboard with grading done automatically by the system. Prior to administering assessments in Blackboard, all tests were paper-based, requiring instructors to determine grades by hand and to provide delayed feedback to students. Administering assessments in Blackboard could enable instructors to monitor real-time trends in student test performance such that group-level feedback could be delivered immediately following evaluation and individual students experiencing problems could be assisted prior to follow-on instruction. Automatic grading also could enable instructors to spend less time working at home and more time working with students having problems with the course content. Reducing the rate at which failing students are recycled through the 25B10 course would reduce the housing, duty pay, and other costs associated with spending extra time at the schoolhouse retaking course content.

Focus group participants estimated that approximately 20% of instructors currently were able to leverage Blackboard's capability to administer exams as described above. They also reported that no formal process existed for training 25B10 instructors to use Blackboard in this way. One of the two non-resident 25B10 instructors interviewed (representing 50% of the population of such instructors) stated that a high frequency of connectivity problems altogether prevented the use of Blackboard for assessment administration. The other non-resident instructor interviewed did not report such problems, but also did not indicate that extensive use was made of Blackboard's assessment function to enhance instruction, perhaps due to staffing shortfalls.

In the case of instructional efficiency, as in the case of course relevance, factors outside the sphere of influence of the Fort Gordon LLC played a role in limiting its impact on how teaching and learning are conducted. Individual instructors who proactively leveraged Blackboard capabilities were able to introduce meaningful change to their classroom conduct, given the limitations imposed by external factors. Outreach by the LLC technical staff could accelerate the process by which other instructors gain proficiency with Blackboard's grade book features, thus helping them to leverage technology for transforming the classroom. The larger matter of course administration requires a shift in how resident student's access instruction (and how such access is granted by the authentication software on Army servers) such that anytime, anywhere access is a meaningful possibility for all students.

*Cost savings*. Reducing the per-student cost of MOSQ instruction may be accomplished by (1) reducing the number of students who must travel to the schoolhouse for instruction; (2) reducing the amount of time students spend in the schoolhouse; and/or (3) increasing the number of students who participate in instruction (given roughly the same number of instructors,

simulations, classrooms, etc.). Providing MOSQ instruction online can reduce per-student costs along the second of these dimensions, according to a pilot study launched by the Signal Center in July 2004.

The purpose of the 2004 pilot study was to explore the feasibility of providing 25B10 instruction to non-resident students in the Army National Guard. Prior to the pilot study, National Guard students were required to go to Fort Gordon to complete the 19.5-week 25B10 course. There were 17 students in the pilot non-resident course, which was administered as a blend of at-home instruction and a one-week capstone exercise held at the Professional Education Center in Little Rock, AR. The pilot study enabled the Signal Center to assess the reduction in salary (i.e., daily base pay), lodging, and meal expenses that would result from shortening the amount of time spent in the schoolhouse from 19.5 weeks (137 days) to 1 week. According to this pilot study, expenses were estimated as shown in the following table.

Table 2. Estimated Daily Expenses for 25B10 Instruction from the Signal Center Pilot Study

| Expense Category | Amount |
|---|---|
| Daily Base Pay | $73.33 |
| Lodging | $69.00 (Fort Gordon, GA); $71.00 (Camp Robinson, AR) |
| Meals | $39.00 |

The data in the table indicate that the per-student duty pay, lodging, and meals costs for sending National Guard Soldiers to Fort Gordon for the full 25B10 course were $24,842.21 and were $1,283.31 for sending these same students to Camp Robinson for the one-week capstone exercise. This represents a 95% reduction in these per-student expenses, and a 93% reduction in cost-per-student when travel expenses ($550) are factored in. When the other costs associated with instruction (e.g., instructor salaries, teaching facilities upkeep and maintenance, hands-on training equipment, etc.) are considered, the % reduction in per-student cost will decrease somewhat further, but it is unlikely that it will be reduced to triviality.

For example, if the additional *per-student* expenses associated with providing non-resident training are estimated to be $25,000, the % reduction in cost-per-student decreases to approximately 50%. Note, however, that a $25,000 per-student cost, in addition to duty pay, lodging, meals, and travel expenses, would be extremely high. Such a per-student cost might be incurred if (a) expensive, sole-purpose facilities must be built to hold the non-resident capstone exercise; (b) the increase in the number of non-resident instructors (and/or hands-on training equipment) is not matched by a decrease in the number of resident instructors (and/or equipment); and (c) the courseware and simulations used for at-home instruction are very expensive and have a short useful life.

Due to Army-level constraints on who is allowed to provide 25B MOSQ instruction, the 25B10 non-resident course has not been administered to National Guard students since the 2004 pilot. For this reason, additional cost savings associated with qualifying 25B10 National Guard Soldiers via non-resident instruction have not been achieved. Analogous per-student cost savings may not be seen for 25B10 students in the Reserve Component who take the course at High-Tech Regional Centers. This is because at High-tech Regional Centers, 25B10 students spend approximately 13 weeks of the course in the classroom. It should be noted, however, that

approval recently was granted for the National Guard to teach the 25B10 MOSQ course, with the necessary resourcing to conduct the course expected sometime in 2008. Reinstatement of this course presumably will resume the associated cost savings.

*Uniform access*. Uniform access to curriculum materials includes the equivalence of instructional content provided to resident and non-resident students as well as the equivalence of the learning experience (i.e., what is done with instructional content) across both types of learner. It enhances course relevance for non-resident learners in addition to instructional quality. Non-resident instructors, as well as the former LLC Program Manager and the Division Chief of 25B resident instruction, indicated that posting 25B10 materials online significantly enhanced the quality and standardization of lecture materials for non-resident students. They stated that online posting of course content made lectures less dependent upon the individual strengths of the instructor and more tightly tied to the learning priorities identified by the proponent. The present analysis examined the percent overlap in 25B10 instructional materials made available to non-resident learners and explored the similarities/dissimilarities in various aspects of learning experience, including technology use and classroom time.

The Fort Gordon LLC has enabled the online posting of 25B10 curriculum materials, however the lead 25B10 instructors at the Tobyhanna and Sacramento High-Tech Regional Centers reported that their course was not based on the same program of instruction currently in use at the Signal Center. One of the interviewees reported that updates to the resident 25B10 program of instruction were not disseminated to the Reserve Component but that such updates could be acquired if one knew the right person to ask. Both interviewees also reported that the course content available to them through the LLC was not the most recent version developed, nor was the recency of course content consistent among them (i.e., they reported that the High-Tech Regional Center in Tobyhanna was using the 2005 version of the courseware whereas the 2004 version was being used in Sacramento). These claims were borne out by examination of the non-resident 25B10 sites present on the LLC. Resident instructors indicated that lags in the Army's Automated Systems Approach to Training process, which posts programs of instruction, prevented simultaneous distribution of the programs of instruction. They also reported that different non-resident locations use different programs of instruction depending on the resources (e.g., hands-on training equipment) available to them.

Examination of the 25B10 course syllabus available via the LLC revealed that both Tobyhanna and Sacramento had the same syllabus, dated August 2003. The contact information present in the syllabus was similarly outdated, with the names of technical support personnel and key leaders in the Signal Center Directorate of Training no longer valid. The course map provided in the syllabus featured different annexes than those present in either the Tobyhanna or Sacramento Blackboard sites. The annexes present in the course websites reflected more recent annex titles, with greater correspondence (than those in the syllabus) to the annex titles in the 2005 resident 25B10 program of instruction (used for 2006-07 resident instruction). Tobyhanna's annex titles had 100% overlap with those in the 2005 program of instruction (i.e., the annex names matched exactly). Sacramento's annex titles had 29% (7/24) overlap with the 2005 program of instruction and 69% (9/13) overlap with the 2004 program of instruction. A more recent (2006) resident 25B10 course map provided for the present research reflected partial differences in annex titles from the 2005 program of instruction. The results of this examination

suggest that the resident and non-resident instructors interviewed had accurate situation awareness regarding the recency and overlap of their course materials.

Table 3. Content (File) Overlap Among Tobyhanna and Sacramento HTRCs

| Annex | % Overlap | Explanation |
|---|---|---|
| Overview & AIS Security (Both HTRCs) | 63% (5/8) | Sacramento had overview documentation and IASO brief that Tobyhanna did not |
| A Plus (Both HTRCs) | 93% (54/58) | Chapter 8 presentation differed across locations; Tobyhanna had an exam that Sacramento did not |
| Network Essentials + (Tobyhanna) Network Essentials (Sacramento) | 26% (17/65) | Fourteen files were Chapter documents that Sacramento had but Tobyhanna did not; Another 14 files were lecture notes that Tobyhanna had, but Sacramento did not; 14 files were the chapter presentation slides themselves, which were different across locations; Sacramento had a student critique and special purpose exercises that Tobyhanna did not |
| TCP/IP (Both HTRCs) | 18% (3/17) | Sacramento had practical exercises that Tobyhanna did not; Sacramento had content for Lesson 2, but Tobyhanna did not; Lesson plans and presentation slides themselves were different |
| Troubleshooting (Both HTRCs) | 100% (36/36) | |
| Routers & Switches (Tobyhanna) Routers/Switches (Sacramento) | 35% (8/23) | Sacramento had Routers folders with no match in Tobyhanna's Routers & Switches annex; Tobyhanna had Router folders with no match in Sacramento's Routers annex |
| Windows XP/2003 Server (Tobyhanna) Windows XP/Outlook (Sacramento) Windows Server 2003 (Sacramento) Exchange & Outlook (Tobyhanna) Exchange Server (Sacramento) | 49% (42/85) | Sacramento and Tobyhanna had completely non-overlapping Windows XP content and completely non-overlapping Outlook content; Tobyhanna had content for installing Exchange 2003 that Sacramento did not |
| Systems Administration/Network Management/Security + (Tobyhanna)Security + (Sacramento) | 100% (21/21) | Tobyhanna did not have systems administration or network management content as was suggested by the annex title |
| UNIX (Both HTRCs) | 100% (23/23) | |
| SOLARIS (Both HTRCs) | 100% (18/18) | |
| MCS (Tobyhanna) | 0% | Sacramento did not have this annex |
| FBCB2 (Tobyhanna) | 0% | Sacramento did not have this annex |
| TIMS (Tobyhanna) | 0% | Sacramento did not have this annex |
| DTOPS/AIS (Tobyhanna) | 0% | Sacramento did not have this annex |
| Communications Exercise (Tobyhanna) | 0% | Sacramento did not have this annex |
| 25B10 Field Training Exercise (Tobyhanna) | 0% | Sacramento did not have this annex |

Examination of the 25B10 course materials in the Tobyhanna and Sacramento High-Tech Regional Center (HTRC) sites revealed marked differences both in organization and content. In both HRTC sites, the folder structure occasionally required students to drill down two or three folders to reach a single document or presentation. Sacramento had numerous duplicate folders

and files. Across the two locations, files were occasionally named differently, but upon examination were discovered to have the same content. Table 3 above details the content differences among the two HTRCs as well as associated explanations. As shown in the table, content overlap in the majority of annexes was incomplete. The non-overlap appeared to have been due largely to files that were present in one location but not in another.

On the basis of this analysis, it appears that the LLC staff has been dutifully posting 25B10 content online, but that uniform access to MOSQ content has not yet been achieved. To some extent, the Fort Gordon LLC may not be able to facilitate fully uniform content due to differences in programs of instruction used. Even if the programs of instruction were the same for resident and non-resident 25B10 students, there would exist some inconsistency in the learning experience across both types of learner. For instance, the head instructor from Sacramento reported that his HTRC lacked most of the hands-on training equipment necessary to teach 25B10 (in particular the annexes on the Army Battle Command System). He appeared to be unaware that some simulations to support his instruction were available in the eSignal downloads portal. A process involving the coordination of resident instruction managers and the LLC staff would potentially circumvent the challenges to presenting uniform course content by (1) facilitating communication and document sharing between the schoolhouse and lead instructors in the Reserves; (2) simplifying and standardizing the interface design for posting course content; and (3) developing a course site interface that provides one-stop access to lecture slides and related simulations.

*Recommendations*

The disconnect between LLC outputs and organizational outcomes revealed in the present analysis should not lead one to conclude that achieving such outcomes for MOSQ is impossible. Nor should this finding be interpreted that the Fort Gordon LLC has failed to function according to specification. The roles of the LLC staff and the managers of resident instruction evolved independently and therefore functioned independently at the time this research effort was conducted. Closer coordination, guided by shared understanding of how the LLC can uniquely improve MOSQ instruction, would increase resident instructors' ability to leverage LLC technologies to transform the classroom and enhance proponent outreach through uniform content push instead of individualized content pull. Factors outside the sphere of influence of the LLC (i.e., Army-level policies, availability of public computing facilities, and institutional curriculum review processes) must be addressed at a higher level, but data collected at the lower level can illustrate the need and direction for change.

## Assessment of Assignment-Oriented Training

*The Sample – 25S10*

The 25S10 Course, which provides MOSQ instruction for "entry-level" (Skill Level 1) satellite communications operators-maintainers, was selected as an example for studying the role that the Fort Gordon LLC plays in enabling the cost-effective delivery of assignment-oriented training (AOT). Regardless of the curriculum-delivery medium, AOT shortens time to competency and reduces skill decay by targeting only the critical tasks that students will need to

perform in the duty position they assume immediately after graduating. Lengthy Advanced Individual Training courses (e.g., 40+ weeks) are broken down into coherent technical "tracks" that target the skills necessary to be qualified to operate unique equipment and/or systems in a particular echelon unit (Barrett, 2001; Kinney, 2005). For example, taken as a whole, the 25S10 course provides common core instruction, instruction for tactical satellite operation, and instruction for strategic satellite operation. All 25S10 students take the common core and then take either tactical or strategic operator instruction, depending on the type of unit to which they expect to be assigned. Presumably because students taking AOT spend significantly less time in the schoolhouse, course throughput may increase as a result, further reducing the cost per student to deliver instruction (Wilson & Helms, 2003).

LLCs can support AOT by enabling students to take, as needed, additional coursework via distance learning if/when their duty position changes (Vann, 2003). The alternate track of the course would be amenable to remote delivery and self-study because students already have a foundational understanding of satellite operation on which to build (see, for example, Shanley, Leonard, & Winkler, 2001). Moreover, allowing students to take the alternate track of the course via distance learning reduces student time in the schoolhouse, which in turn reduces training cost and enhances readiness because learners can remain with their unit and families (Leonard, Winkler, Hove, et al., 2001). The 25S10 course was selected for analysis because it was among the first of the MOSQ courses to be made available in the AOT format (at that time, the 25S MOS was called 31S). It was transitioned to AOT format in 2002.

*Assessment Questions & Method*

The analysis of AOT impact assessed the outcomes of delivering the 25S10 course in an AOT format. Specifically, the following questions were asked and associated metrics used to focus data collection:

- Question: Does delivering 25S10 in AOT format reduce time to competency?
  - Metric: % reduction in course duration
- Question: Does delivering 25S10 in AOT format enhance course relevance?
  - Metric: Unit commander/Training supervisor perceptions of course relevance
  - Metric: Student perceptions of course relevance
- Question: Does delivering 25S10 in AOT format increase student throughput?
  - Metric: % increase in enrollment and graduation after LLC implementation
- Question: Does LandWarNet eSignal enhance the delivery of AOT?
  - Metric: % intended target audience (i.e., 25S10 follow-on students) registered to use the system

The primary means used to capture the above metrics were interviews. The Division Chief for 25S instruction was interviewed, as was the Chief of the Resident Training Management Branch[4], the LandWarNet eSignal Program Manager, the Signal Center Director of Training who oversaw initial AOT implementation, and three Signal Center Quality Assurance

[4] During the course of this research effort, this person assumed a new position as the Chief of Training Management at the Signal Regimental NCO Academy. The previous position is referred to in this report because it was in this capacity that the interviewee served during the timeframe of interest.

personnel. The program of instruction for the 25S10 course also was examined to partially determine the change in course duration affected by AOT. Unfortunately, data from the Army Training Requirements and Resources System (ATRRS) database could not be used directly to answer questions about student throughput. ATRRS-based information about student throughput was retrieved indirectly through discussion with the Chief of Resident Training Management. In addition, because the available ATRRS records did not go back far enough to compare course enrollment/graduation numbers before and after the implementation of AOT, discussion centered on enrollment/graduation trends over the years of offering 25S10 in AOT format. Archival studies conducted by the Quality Assurance Office and by the TRADOC Analysis Center (Kinney, 2005) were examined for information about the impact of AOT on Soldiers and units in the field.

*Summary of Findings*

The results of the 25S10 assessment tentatively suggest that providing Advanced Individual Training courses in AOT format can significantly reduce course duration, thus saving money and potentially reducing time to competency. Strong statements about the enhancement of operational performance or unit readiness due to reduced time to competency could not be made, but no negative impact on performance was demonstrated. Training and human resources management issues appeared to prevent AOT from achieving its full, envisioned impact on student throughput and online course delivery through the Fort Gordon LLC.

Outreach to operational units who received AOT graduates appeared to be quite challenging. Despite a smoothly functioning process, surveys administered remotely by proponent quality assurance personnel received few responses. In contrast, an archival study of AOT effectiveness (Kinney, 2005) produced a wealth of data, but it lasted two and a half years and involved six site visits conducted by a team of researchers. These findings suggest that the success of future assessments of LLC impact on unit outcomes will depend on the coordinated effort of parties at the proponent and Army level, including the TRADOC Analysis Center.

*Detailed Findings*

*Time to Competency.* Using the reduction in course duration as a metric, delivering the 25S10 course in AOT format significantly reduced time to competency. Prior to AOT, the 25S10 course lasted approximately 46 weeks[5]. According to the 2007 Fiscal Year, 2nd Quarter program of instruction, students taking 25S10 in the AOT format only spent 26 weeks in the schoolhouse. This represents a reduction of 43% time in the schoolhouse. An analogous reduction in cost associated with housing each student could be expected, although travel costs to and from the schoolhouse would not be affected (and could possibly increase if re-assigned graduates returned to the schoolhouse for alternate-track instruction).

*Course Relevance.* Past assessments of AOT conducted by the Signal Center have involved capturing commander/supervisor and student impressions of course relevance via

[5] Because a pre-AOT version of the 25S10 course was not available, the duration of the 25S10 course prior to implementation of AOT format is the average of two estimates (42 weeks and 50 weeks) given by two different interviewees.

survey. Surveys were administered by the Quality Assurance Office via the Automatic Survey Generation (AUTOGEN) tool. The most recent AUTOGEN survey on 25S10 was administered from April to Nov 2005, and data were reported internally in July 2006. This survey asked 25S10 graduates (tactical and strategic tracks) and their supervisors to report on their ability to perform critical technical tasks to standard[6]. In the present research, the intent was to work with this existing survey data such that duplication of effort could be avoided and outreach beyond the institutional setting could be achieved. Unfortunately, the response rate (for both graduates and supervisors) to the surveys was too low to draw conclusions. The response rate for supervisors of tactical 25S10 graduates was 0%. For graduates it was 3%. For the strategic track 25S10 graduates and supervisors, the response rate was 0%.

In the absence of AUTOGEN survey data, a preliminary assessment of AOT conducted by the TRADOC Analysis Center (Kinney, 2005) offered a partial answer to the question of AOT impact on unit outcomes. In this study, research team members visited 17 signal battalions in six locations, conducting surveys and interviews with the graduates of four AOT courses (25F10, 25P10, 25Q10, and 25Q10) and their supervisors. According to Kinney, 60% (9/15) of 25S10 graduate supervisors reported that AOT-trained Soldiers were "basically the same" as traditionally trained Soldiers. Twenty-seven percent (4/15) claimed that AOT-trained Soldiers were worse, and 13% (2/15) claimed they were better. In any case, supervisors were unanimous in reporting that they treated AOT-trained and traditionally trained Soldiers the same with regard to unit training and work assignments. These results tentatively suggest that the readiness impact of AOT may be seen primarily in greater institutional training efficiency, rather than enhanced unit proficiency.

Another way to look at course relevance is to determine the percentage of students who are placed in units for which they have received the "correct" track of the course. As noted in Shanley, Crowley, Lewis, Masi, Straus, Leuschner, et al. (2005) and Kinney (2005), AOT places a nontrivial burden on personnel management systems to link individuals' training and duty assignments. Kinney (2005) detailed several human resources management issues that gave rise to the malassignment of AOT graduates, including (1) lack of automated databases for tracking and assigning Soldiers with unconventional identifiers (i.e., additional skill identifiers instead of MOS designations); (2) confusion over manual data entry responsibilities; and (3) confusion over how to assign Soldiers with unconventional identifiers. Interviews with both the Division Chief and the Chief of the Resident Training Management Branch indicated that the accuracy of student placement was very high (≥95%). Kinney (2005) largely supports these observations, citing an 8% malassignment rate for AOT overall and a 10% malassignment rate for 25S10.

*Student Throughput.* As described previously, delivering the 25S10 course in an AOT format reduced the length of the course by 43%. Reducing the course by this much time introduced the possibility that the course may be delivered roughly twice as often, thus approximately doubling the student load each academic year. Increased throughput has obvious implications for reducing the cost per student (cost of administering the course per student would be roughly halved) and enhancing readiness (enhanced training and personnel status), which were expected benefits of AOT detailed by the initial planners of the Fort Gordon LLC (Wilson & Helms, 2003). Interviews with both the 25S Division Chief and the Chief of the Resident

[6] Consistent with TRADOC practice, "standard" was defined in the survey as 80% GO.

Training Management Branch indicated, however, that student throughput has not changed since the implementation of AOT. The Resident Training Management Chief citied a level trend in ATRRS enrollment/graduation data since the initial years of AOT.

The 25S Division Chief provided some explanation for this level trend. He reported that the introduction of AOT has led instructors to become more specialized such that their ability to teach across topics has become more limited. Instead of the same instructor teaching both the tactical and strategic tracks of the course, different instructors teach each segment because they are held at the same time (because both tactical and strategic students begin at the same time by taking the common core). Teaching the course in overlapping tracks therefore would require more instructors, rather than the same number, and more instructors are not available. 25S historically has been a MOS with persistent shortages, as reflected in the monthly readiness reports of the Chief of Staff of the Army (Shanley, Leonard, & Winkler, 2001). Soldiers with the necessary skills to operate satellite communications equipment therefore are assigned to units that need them.

*Online Delivery of AOT.* The adoption of the Fort Gordon LLC to deliver AOT is reflected in the percentage of the intended target audience registered to use the system for this purpose. In the case of the 25S10 course, the intended target audience would be those students who are reassigned after graduation and must complete a different track of 25S10 instruction. According to the initial plans for AOT, the Gordon LLC technologies would be used to deliver this follow-on instruction (Wilson & Helms, 2003). Currently however, the LLC is not used to deliver follow-on 25S10 instruction, largely due to difficulties with the automated management of individual training assignments. Students instead return to the schoolhouse to complete their training.

That said, true cost savings associated with delivering follow-on AOT training via the LLC are demonstrated when the intended user audience is very large. In the case of 25S10, this is not the case. The 25S Division Chief estimated that only a very small percentage (fewer than 5%) of 25S10 graduates require follow-on instruction. The cost savings associated with reducing course duration therefore reflect the majority of cost savings that could be achieved via AOT, at least for the 25S10 course.

*Recommendations*

Recommendations for enhancing the impact of AOT on unit outcomes must be directed outside of the scope of the LLC. Factors affecting impact apparently were driven by a lack of policy on how to interpret and manage unconventional identifiers (i.e., additional skill identifiers) for tracking training status and making unit assignments. If developed, this policy could be used to design databases for automatically performing these management functions. Perhaps more importantly, such policy could serve as a springboard for developing personnel management practices that align the particular capabilities of individual Soldiers to the specific competency requirements of units. Such practices would significantly expand the possibilities for implementing lifelong learning on an Army-wide scale.

## Assessment of Simulations

*The Sample – 25N10 & Joint Network Node (JNN) Simulation*

The 25N10 course provides qualification instruction for the 25N MOS created in October, 2005. It prepares "entry-level" (Skill Level 1) nodal network systems operators-maintainers to perform basic operations with the Joint Network Node (JNN) Network, which the Army has selected to replace legacy Mobile Subscriber Equipment. At the time of writing this report, the 25N10 course did not have a non-resident version and course content was not hosted in the Fort Gordon LLC for resident students. All instruction was performed in the classroom via lecture and practical exercise. Since its inception, the 25N10 course has made use of equipment simulations to facilitate classroom instruction and practical exercise performance. This practice is consistent with the historical use of training technology (i.e., interactive videodisc) to support Army communications training in the schoolhouse (Winkler & Polich, 1990).

Specifically, simulated JNN equipment was used to supplement hands-on training by giving 25N10 students the opportunity to practice basic operations on a desktop computer while waiting to conduct hands-on training with actual equipment. As described earlier in this report, equipment simulations such as the JNN courseware use the scaffolding approach to instruction, walking students through an Acquire → Practice → Validate sequence for each skill to be learned. The same simulation used in the 25N10 course also has been made available as a stand-alone download in the Fort Gordon LLC. Learners outside of the schoolhouse setting (e.g., deployed signal Soldiers) who have common access cards can retrieve the simulation from LandWarNet eSignal, and many have. As of September 17, 2007 the JNN simulation had been downloaded 2,371 times for refresher training or preparation for hands-on, on-the-job learning with new equipment.

By studying the use of equipment simulations in schoolhouse instruction and by non-resident learners, it is possible to assess their effectiveness as learning tools in a variety of settings. It is because of JNN simulation availability in multiple learning contexts that it and the 25N10 course were selected for analysis. Simulations have been proposed to be at least a partial alternative to hands-on training, thereby reducing time on equipment and equipment-related costs, while simultaneously maintaining pedagogical standards (e.g., Wilson & Helms, 2003; Winkler & Polich, 1990). It should be noted that one annex of only one course, using a single suite of simulations provided by a single contractor, was assessed in the present research. In addition, the 25N10 course, having never been administered without simulations, cannot permit before-after comparisons of some metrics of interest, including time savings, equipment requirements, and student throughput[7]. A rigorous, scientific study has been conducted to assess the use of simulations for Army communications training (Winkler & Polich, 1990), which was used to provide a context for interpreting the findings of the present research. On the basis of this additional context, some specification of the generalizability of the present findings is provided below.

[7] Other types of analyses to capture these metrics were performed as part of this research. Consistent with the qualitative causal approach, these alternative analyses focused on the processes that would enable such outcomes as time savings, equipment requirements, and throughput.

*Assessment Questions & Method*

The analysis of simulation implementation and use for lifelong learning focused on the output and outcomes associated with using equipment simulation to provide schoolhouse and on-the-job instruction on basic Joint Network Node-Network operations. Specifically, the following questions were asked and associated metrics used to focus data collection:

- Question: Does the use of simulations in 25N10 save time on equipment?
  - Metric: % reduction in time on equipment
- Question: Does the use of simulations in 25N10 enhance instructional efficiency?
  - Metric: % instructors who report using increased class time to enhance instruction
- Question: Does posting the JNN simulation on the LLC enable uniform access to JNN-related learning content?
  - Metric: Equivalence of learning experience across resident and non-resident learners
- Question: Does the JNN simulation enable just-in-time competency?
  - Metric: % on-the-job simulation users who report that the JNN simulation enabled just-in-time competency
- Question: Does the use of simulations for 25N10 broaden thinking about where and how technical training can be accomplished?
  - Metric: % students and instructors who believe that simulations can serve as a substitute for hands-on, classroom training

To capture metric data, a combination of focus groups, classroom observation, and survey was used. Specifically, two focus groups were conducted, one with 25N10 students ($N$ = 16) and one with 25N10 instructors ($N$ = 5). The purpose of these focus groups was to gather impressions of the effectiveness and utility of the JNN simulation for resident 25N10 instruction in general. Classroom observations (with different students and instructors than those interviewed initially) then were conducted during one of the annexes of the 25N10 program of instruction. This annex focused on the basic functions of the Promina system. Two lecture → simulation → hands-on training sequences (Database Management and Basic Trunks Services) from this annex were observed. It should be noted that this small sample of students and the particular course annex selected may not be representative, however the findings from the present analysis is consistent with previous scientific analyses and with adult learning theory so the sample is likely not an outlier. An online survey of on-the-job users of the JNN simulation was administered via LandWarNet eSignal. The survey was posted in the Downloads site of eSignal and was open for approximately 3 weeks, but received no responses.

*Summary of Findings*

The JNN simulation was actively used in the 25N10 course and frequently downloaded from the eSignal Downloads site. Instructors used the time saved by learning via desktop simulation to enhance the training they provided with hands-on equipment. Use of equipment simulations allowed for greater practice time on equipment procedures, which has positive theoretical implications for skill retention. Instructors and students alike endorsed simulation-supported instruction and had forward-thinking views about how to use simulations to improve

learning. Anecdotal evidence indicated that the stand-alone JNN simulation download could be used in a manner similar to schoolhouse classroom to enable just-in-time competency development. However, more research will be necessary to understand how simulation downloads are used by distributed learners. The impact of the JNN simulation on just-in-time competency development could not be determined due to lack of survey response data.

The present findings, coupled with previous scientific study (Winkler & Polich, 1990) suggested that desktop simulations can partially substitute for hands-on training. The general caution that simulations cannot replace hands-on instruction was supported by the 25N10 classroom observations. Inconsistencies between the JNN simulation and the actual equipment caused difficulty for some students as they transferred automatic, but incorrect skills from their desktop computer to the hands-on training equipment. Characteristics of the actual JNN equipment omitted from the simulations had to be addressed using hands-on training time. Instructors observed that a faster contracting cycle would significantly accelerate the delivery of up-to-date simulations.

*Detailed Findings*

*Time on equipment.* Focus group interviews revealed a difference of opinion regarding the degree to which simulations reduced the time required to achieve proficiency with actual JNN equipment. 25N10 students reported that little transferable learning was accomplished with the simulations, citing fidelity shortfalls and simplistic learning objectives as reasons for limited utility. For example, students indicated that they could get the correct answers during the Practice and Validate phases of the simulation without knowledge of the underlying principles of how the simulated equipment worked. They also stated that the simulations did not allow them to make mistakes that they could make on the actual equipment, thus preventing them from learning how to undo their actions in an operational situation.

In contrast, 25N10 instructors reported that using simulations to practice foundational skills allowed students to achieve proficiency with actual equipment faster than they would without such practice. Although they acknowledged limitations of simulations, instructors saw accelerated learning as a key benefit of their adoption. Instructors also noted, however, that enhanced proficiency with hands-on equipment did not actually reduce student time on the equipment, but rather allowed instructors to make better use of the equipment time available.

Classroom observation supported both of these contrasting perspectives. First, the observations that students made about the simulations were partially validated. The simulations did have some functional dissimilarity from the actual equipment, which affected skill transfer for some students. A small minority of students found it frustrating to override incorrect, but automatic skills developed using the simulations (e.g., use of arrow keys and command line text) when they transitioned to hands-on training. Unlearning automatic skills increased hands-on equipment time for these students relative to those who did not have such difficulty. Skill development using the desktop simulation was subject to decay, and when students made mistakes on basic procedures, they did not know how to undo them on the actual equipment. In addition, there were aspects of the actual equipment, such as status lights, which convey important information about the success of task execution, that were not part of the simulations.

Students' questions during the hands-on training that were observed often addressed the meaning of the status lights and their relation to the task at hand.

Second, classroom observations validated the instructors' report of reduced time to competency and enhanced use of class time. Although printed materials with detailed instructions were available to students during hands-on instruction, at least half of the students did not need to refer to them to complete hands-on exercises. The amount of time spent acquiring the analogous skills using the desktop simulation was approximately 10-15 minutes. Students using hands-on equipment moved quickly through the basic skills, and instructors optimized (rather than shortened) the learning experience by drawing linkages between task performance and the components of the equipment not reflected in the simulation (e.g., status lights and installation activities). Given the roughly equivalent skill transfer associated with simulation-supported instruction versus hands-on only training found in Winkler and Polich (1990), one might assume that the same amount of time spent learning on the desktop simulations would have been spent learning on the hands-on training equipment. This represents a significant time savings that could be used to enhance the hands-on training experience, even though time on equipment was not reduced.

An important implication of coupling desktop simulation with hands-on training was that, in one sense, time on equipment actually increased. That is, students had the opportunity to increase the time spent on practicing equipment procedures, regardless of whether the equipment was real or virtual. The Acquire → Practice → Validate sequence used in the desktop simulation required students to practice the same procedure three times, whereas the hands-on training would only have supported going through the procedure enough times to demonstrate proficiency. Moreover, students could practice the procedures on the desktop simulations as many times as they wished, depending on their self-estimate of proficiency. The additional training time, which could be as short as 5 minutes (i.e., the observed average time spent on hands-on training demonstrating proficiency) or as long as students wished, would enhance skill retention for which initial levels of proficiency is the leading predictor (Arthur, Bennett, Stanush, & McNelly, 1998). The present findings are consistent with Winkler and Polich (1990).

*Instructional Efficiency.* Instructor interviews in both focus groups and classroom settings indicated that, in general, time on equipment was not reduced by simulations, but rather that simulations enhanced scheduled hands-on training. 25N10 classroom observation supported this perspective by revealing that hands-on training was used to increase the basic proficiency accomplished via desktop simulation practice and to develop skills not addressed by the equipment simulations. As described in the previous section, instructors enhanced hands-on training by explaining the meaning of equipment status lights, providing students with opportunities to make and undo errors, and highlighting links between the classroom theory and practical procedures.

*Equivalence of learning experience.* To the extent that technical skill development using simulations involves analogous instructional strategies across diverse learning contexts (e.g., classroom vs. field settings), the learning experience and projected effectiveness of the training may be considered to be equivalent. Clark (1994) has argued (and others, e.g., Sitzmann, Kraiger, Stewart, & Wisher, 2006, have demonstrated) that instructional technology is only as

effective as the pedagogy it supports. The training and education literature indicates that some key components of effective pedagogy, especially as it relates to technical skill development and computer-based instruction include scaffolding, interactivity, and application (Abell, 2003; Firdyiwek, 1999; Hays, Stout, and Ryan-Jones, 2005). Particularly for those people using simulations to learn outside of the classroom context, therefore, structured engagement with content and contact with others, i.e., peers and mentors, during the learning process should be considered critical to learning outcomes. This is especially true when simulations deviate from actual equipment function, which is commonly the case because equipment versions change faster than their associated desktop simulations do.

In the 25N10 course, simulations were used as learning tools within the context of lectures about how the system works generally. The lecture slides presented high-level bullet points and diagrams, and the instructor augmented this content with additional information about how the equipment functions and its integration into the larger signal environment. The instructor also engaged the students by asking questions and using humor. Classroom observations further indicated that 25N10 students and instructors had high levels of interaction while using the simulations and transitioning from simulations to hands-on equipment. In particular, instructors made students aware of the specific ways the simulations behaved differently from the actual equipment. For example, during the classes observed, there was a particular function for which the simulation behaved in exactly the opposite way than the actual equipment. For the present researcher, this difference caused a great deal of confusion while observing hands-on training, but students had been made aware of it in an earlier lecture (not observed) and so knew to work around the problem. Instructors also encouraged students to use the simulations to enhance retention through repeated practice before and after hands-on training. All of these practices, according to commonly accepted learning theory (e.g., American Distance Education Consortium, 2003; Chickering & Gamson, 1987; University of Illinois, Urbana-Champaign, 1999), should be expected to maximize the learning benefit of using simulations.

Unfortunately, due to the lack of response to the JNN survey administered to eSignal users, a direct comparison could not be made between the simulation-supported learning experience in the classroom and in the field. Some differences in learning experience may be assumed, however, given that the JNN simulation download was not coupled with 25N course materials, such as lecture slides. Possibly more importantly, the download was not accompanied by explanations of the differences between the desktop simulation and various versions of the actual JNN equipment. Discussions in the eSignal technical forums would be one place to provide peer mentorship on these topics, but such discussions were not observed in the analyses of the forums detailed later in this report. Discussions did address difficulties in downloading the large files associated with the JNN simulation and brought up questions of versioning.

An alternative source of mentorship for on-the-job learners might include more senior Soldiers who have greater experience with JNN operations. This possibility was presented as likely in the focus groups with 25N10 students. One unit trainer interviewed as part of this research effort reported that he used the JNN simulation download to teach 12 subordinates using a classroom setting. The classroom setting enabled students to learn individually at their own workstations but in a group setting similar to that observed for 25N10 instruction. Beyond these

indirect inferences and anecdotal evidence, no further conclusion may be made about the equivalence of the learning experience for schoolhouse and on-the-job learners.

*Just-in-time competency.* Unfortunately, due to lack of response to the JNN survey, the ability of desktop simulation to enable just-in-time competency could not be analyzed. Download data alone cannot be used as a proxy for just-in-time competency because it is unknown what is done with the simulations after they have been retrieved. The previous example of the unit trainer who conducted classroom JNN training with the simulation download suggests that just-in-time competency can be supported by simulations, however. This person actively sought out the simulation to conduct training while his unit waited to receive the actual equipment assigned to them. Greater detail on how the downloads are used will go a long way toward understanding LLC impact on just-in-time competency.

*Broader thinking.* As described previously, it has been proposed that simulations may be considered at least a partial substitute for hands-on training with actual equipment (Wilson & Helms, 2003; Winkler & Polich, 1990). Such a substitution would potentially reduce the cost-per-student of MOSQ instruction in the schoolhouse (and at other locations) by reducing the need for costly training equipment. In addition, the education of non-resident learners, such as those in the Reserves who complete their instruction at High-Tech Regional Centers, could be made more equivalent to that of students in the schoolhouse by increasing access to equipment function. The adoption of simulations as an alternative to hands-on training requires broader thinking about what may be considered a learning environment such that learners (1) seek and use simulations rather than awaiting classroom instruction; (2) actively use simulations to aid in initial learning and retention; and (3) encourage the use of simulations for the training of others.

Members of both the 25N10 student and instructor focus groups unanimously supported the use of equipment simulations for technical skill development. Moreover, they had forward-thinking ideas about simulation properties that would better address higher-level cognitive skills. These ideas included embedding short scenarios into the simulation instruction that required learners to troubleshoot equipment malfunctions and networking simulated systems together such that students could experience the challenges to achieving the interoperability of joint network nodes. That said, there also was unanimous agreement among the members of both the student and instructor focus groups that simulations should not be considered a substitute for hands-on training with actual equipment. Their concerns stemmed from the conclusion that simulations could not fully replicate the functionally of actual equipment. These conclusions were supported by classroom observations, which indicated that dissimilarity partially challenged the learning process. Winkler and Polich (1990) also found that compared to students trained solely on hands-on equipment, students trained primarily using alternative technology (interactive videodisc) had slightly higher error rates in hands-on test conditions.

Achieving the technological sophistication necessary to fully replicate JNN functionality would be costly, technically difficult, and would require that the contracting cycle (to develop/modify simulations) keep pace with the equipment update cycle. It is unknown whether effort and resources invested in developing high-fidelity networked simulations would produce the cost-benefit tradeoff expected from simulations.

*Recommendations*

More information on the impact of simulation downloads on unit outcomes is required. LLC staff could support efforts to collect external data on simulation use in the field by providing relatively simplistic methods for reporting on effectiveness. For instance, a rating capability and comments area associated with each download in the Downloads page of eSignal would present a quick and simple way for remote users to provide feedback and information about simulation functionality. Follow-on discussion led by the eSignal technical forum facilitators could provide further detail on how simulations are used in the field. This information would be useful not only for assessing simulation use but also for communicating to the field Army the training caveats that must be observed in order to use the simulations effectively. In this way, the proponent could assist in the mentoring process for distributed learners through the LLC staff. Closer coordination between the LLC staff and the resident instruction managers would increase the likelihood that other supporting materials, such as lecture slides, were posted along with simulation downloads. Some efforts to provide this type of supporting information were begun during the course of this research effort.

Taking a longer-term view, for simulations to have an impact on the bottom line (i.e., cost savings associated with reduced time on equipment), as well as retention (Arthur et al., 1998) they will have to better replicate system functionality through a combination of in-depth task analysis, effective instructional design, and an accelerated contracting cycle. An in-depth task analysis would enable simulation developers to better understand both the explicit and implicit tasks that must be executed to operate equipment. Instructional design then could exercise more of the higher-level cognitive skills that trainees must use to monitor, troubleshoot, and integrate the equipment through a combination of scaffolding and scenario-based training. Simultaneous use (by large groups of students) of networked desktop simulations for such practice would shorten the number of hours spent on actual equipment, with equipment being used to validate rather than instruct. Networked simulations also could support the integration of on-the-job learners into ongoing resident instruction. An accelerated contracting cycle would enable more rapid modification to existing simulations, thus allowing updates to simulation functionality to keep pace with analogous equipment updates.

## Assessment of Discussion Forums

*The Sample – LandWarNet eSignal Technical Forums and LandWarNet Leaders Forum*

Both the LandWarNet eSignal technical forums and the *LandWarNet Leaders Forum* were assessed as part of this research. Discussion forums represent the significant potential of lifelong learning centers to foster and enable culture shift toward anytime, anywhere participation in professional self-development, organizational enculturation, and knowledge management. Discussion forums also play a key role in fostering the development of professional learning communities, which help to give a common identity to distributed learners. Examining the *Leaders Forum* provided the opportunity to explore the current status of the Fort Gordon LLC in fostering culture shift toward the use of discussion forums for lifelong learning and horizontal information sharing. Analyzing the eSignal technical forums enabled an

investigation of how the Fort Gordon LLC supports these ongoing efforts by distributed Signal Soldiers.

It is much easier to build a collaborative meeting space than it is to foster transformative use of that space (Cianciolo, Heiden, & Prevou, 2006; Wenger, McDermott, & Snyder, 2002). Yet, user activity is critical to achieving the organizational impact expected to result from investments in collaborative meeting space. For this reason, assessing the status of the discussion forums component required going beyond the impressive number of forums already established in eSignal and investigating how these forums were used and to what extent they fostered knowledge development and professional growth. The development of social and intellectual capital in discussion forums is a critical determinant of professional growth (Cianciolo et al., 2006; Lesser & Storck, 2001) and also is feasibly (and relatively objectively) measured, so it served as the focus of the present research. Four aspects of social and intellectual capital growth defined elsewhere (Cianciolo et al., 2006; Dixon, Allen, Burgess, Kilner, & Schweitzer, 2005) were used to frame assessment: connections, context, content, and conversation.

*Assessment Questions & Method*

The analysis of discussion forums as contributors to lifelong learning community development focused the output and outcomes associated with implementation of the technical forums and *Leaders Forum*. Specifically, the following questions were asked and the associated metrics were used to focus data collection:

- Question: Are the discussion forums being actively used?
  - Metric: % of registered users actively using the system (adoption rate)
- Question: Are the discussion forums supporting the development of interpersonal connections?
  - Metric: % of posts that contain referrals (to self or others) for additional information or expertise
  - Metric: % users with basic biographical information viewable by others
- Question: Are the discussion forums supporting the development of organizational context?
  - Metric: Presence of "built-in" opportunities to participate in shared experiences
- Question: Are the discussion forums fostering the use and distribution of content?
  - Metric: % of knowledge contributions (i.e., downloads) made by target members (as opposed to facilitators)
  - Metric: % of knowledge contributions (i.e., downloads) with contextualizing descriptions
- Question: Are the discussion forums fostering active conversation?
  - Metric: % of discussion contributions made by target members (as opposed to facilitators)
  - Metric: % of initial posts followed by a meaningful response within 24 hours (i.e., not just an acknowledgement)
  - Metric: % of conversation threads whose posts contain references to one another
  - Metric: % of incidents of unprofessional commentary

To assess the Fort Gordon LLC discussion forums, sections of the forums themselves were analyzed directly. For the *Leaders Forum*, the discussion and knowledge-posting activity of particular individuals were analyzed. These individuals were selected based on their class enrollment. Beginning in the Spring of 2007, students in the Basic Officer Leadership Course (BOLC), the Basic Non-Commissioned Officer Course (BNCOC), and the Advanced Non-Commissioned Officer Course (ANCOC) received an assignment to demonstrate certain knowledge management proficiencies using the *Leaders Forum*. These proficiencies included starting a discussion, participating in a discussion, uploading a document to the forum, and editing a profile containing biographical information. The intent of this assignment was to foster interest in and ability to use the eSignal technical forums and the BCKS professional forums. Students who had received the assignment and who had several months to complete it prior to the conduct of this investigation were selected to analyze the rate of participation in the assignment and in the *Leaders Forum* generally. The total number of students selected was 68 (44 BOLC students, 10 BNCOC students, and 14 ANCOC students).

In the case of the eSignal technical forums, conversations in particular topic areas were selected for analysis on the basis of their presumed relevance to the forum members and the present research effort. These topic areas included notes from the field (including lessons learned from Operation Iraqi Freedom and Operation Enduring Freedom), technical support (for communications systems and for eSignal itself), and specialty areas for 25B, 25N, and 25S. Topic areas that were left out included TRADOC Lifelong Learning Center (resource requirements and master plans), general discussions (e.g., high-level conversation on information assurance, LandWarNet, LINUX, etc.), and specialty areas not including 25B, 25N, and 25S (e.g., S6, Warrant Officer, 25U, etc.). The number of conversations analyzed was 179, representing 18% (179/1003) of the number of conversations currently ongoing at the time of this analysis and 19% of the number of discussion posts (810/4247).

*Summary of Findings*

Analysis of the well-established eSignal technical forums revealed steady use of the forums over the past four years, which have been populated by numerous professional, helpful conversations. The percentage of registered users participating in discussions was below that described as typical for active forums (1-3% compared to 25-35%), but this level of activity reflected a foundation on which the forums can be built further. The technical forums began as mechanism for providing technical support to LLC users, but have evolved to meet more diverse needs. Discussions were primarily conducted among users of the forums, rather than by the LLC technical staff, suggesting that forum members felt some sense of ownership over the collaborative space. Levels of professionalism were very high, especially in an unmoderated setting. These characteristics suggest that active cultivation of discussion in the forums would be successful in further developing the signal learning community.

The *Leaders Forum* represented a pilot effort for exploring how to cultivate discussion and other activity using BCKS as the online collaborative space. The focus of this pilot was on establishing the mechanics of knowledge management, such as the use of collaborative software. During the course of this investigation, lessons were being learned about what sort of content could stimulate conversation and what situational characteristics acted to motivate Soldiers to

use online discussions to communicate with each other. Activity in the forums reflected acquisition of the "science" of knowledge management, but the development and implementation of a strategic plan for integrating existing forums into the knowledge management assignment would enhance the cultivation of communities of lifelong learners.

*Detailed Findings*

*Adoption of Forums*. To explore the use of discussion forums, the percentage of BOLC, BNCOC, and ANCOC students who demonstrated particular proficiencies in *Leaders Forum* as outlined in their knowledge management assignment was determined. These proficiencies, as listed above, were: (1) start a discussion; (2) participate in a discussion; (3) upload a document to the forum; and (4) edit biographical information. These proficiencies were selected from a larger list (e.g., including "know the difference between tacit and explicit knowledge" and "download a relevant piece of knowledge") because they could be linked directly to specific individuals and could be assessed by analyzing forum activity. The results of the analysis are shown below, and include only those students who were registered in the forum [93% (13/14) of the ANCOC students were not registered in the forum and 18% (8/36) of the BOLC students were not registered].

Table 4. Knowledge Management Assignment Completion Rate

| Proficiency | BOLC ($N = 36$) | BNCOC ($N = 10$) | ANCOC ($N = 1$) |
|---|---|---|---|
| Start discussion | 53% (19/36) | 10% (1/10) | 100% (1/1) |
| Participate in discussion | 58% (21/36) | 0% (0/10) | 0% (0/1) |
| Upload file | 0% (0/36) | 10% (1/10) | 0% (0/1) |
| Edit bio | 86% (31/36) | 10% (1/10) | 100% (1/1) |

As shown in the table above, the adoption rate of the *Leaders Forum* was moderate. Although ANCOC student participation was occasionally at 100%, this sample size was only one student, and should not be considered a representative sample. The moderate participation rate was apparently driven by the BOLC students, who completed the assignment at a significantly higher rate than the BNCOC students. Becoming a member of Leaders Forum is one of the knowledge management proficiencies that was not assessed because it was unclear whether students were responsible for registering themselves or if they were enrolled as a group by someone else. To the extent that registration was voluntary, adoption rates were best for the BNCOC students (100%). Moreover, all of the BNCOC students were cross-registered as members of *NCO Net* – another BCKS forum. High percentages of both BNCOC students and ANCOC students [90% (9/10) and 93% (13/14), respectively] were potentially cross-registered as members in the eSignal technical forums.[8] Three of the 44 BOLC students (7%) were cross-registered in other BCKS forums and 27% (12/44) were potentially cross-registered in the

[8] Cross-registration in the eSignal technical forums was determined by searching the technical forum member list for the names of the BOLC, BNCOC, and ANCOC students. The technical forums member list did not include biographical data, so where common names (e.g., Ralph Jones) were found, it could not be verified for certain whether the student name and technical forum member name belonged to the same person.

eSignal technical forums. None of the students in any course made content or conversation contributions in the e-Signal technical forum discussions analyzed.

The relatively high frequency of forum cross-membership among the BNCOC and ANCOC students suggests that limited activity among *Leaders Forum* members was not necessarily due to unwillingness to access knowledge management resources. An alternative explanation is that the number of passionate, active participants in an online community typically represents a small proportion (25-35%) of the member population (Wenger et al., 2002). At least in the case of the BOLC students, member activity well exceeded this range. Examination of the posts made by BOLC discussion participants, however, indicated that approximately 36% (28/77) of the contributions were made primarily to complete the assignment requirement, rather than to engage the professional community and conduct self-development. For example, one of these posts said "I'm trying this out for my homework." A chain of posts following an initial post said "interesting," then "really interesting," then "seriously interesting." It appeared that the "science" of knowledge management was successfully acquired by these students, as expected, but that the pilot forum was not yet a ready canvas for the "art" of knowledge management.

A second, more likely alternative explanation is that the students had other, more effective means for sharing information with their peers. First, the students were co-located at Fort Gordon, so much of their communication could happen face-to-face instead of online. Second, limited public computing facilities on post reduced the ease with which students could actively engage in online discussions outside of the classroom when they were not co-located. Third, participation in *Leaders Forum* was part of an assignment and not a natural outgrowth of interest in what the forum had to offer. The pilot *Leaders Forum* purposefully was established largely devoid of content in order to serve as a place for demonstrating and cultivating the collaborative knowledge development processes. However, the initial content in a forum is critical for engaging members in active participation (see, e.g., Dixon et al., 2005). Moreover, it appeared that the content needs of the *Leaders Forum* target audience could be addressed by visiting other forums, such as *NCO Net* or *PlatoonLeader.mil*.

At the time of conducting these analyses, there were 56,154 registered users in the eSignal technical forums. Of this number, 299 unique members contributed to the conversations sampled as part of this investigation, representing less than 1% of the membership. Additional, unique forum members would almost certainly be represented if all of the conversations had been sampled, but by the same token, other members who participated in the sampled discussions would not. Assuming that the same ratio of unique contributors to conversation posts found in the analyzed conversations [37% (299/810)] also characterized the unanalyzed conversations, then approximately 3% (1,571/56,154) of registered users contributed to ongoing conversations. This percentage is less than the 25-35% active participation rate cited in Wenger, et al (2002). In the discussions analyzed, roughly the same number of posts were made in 2004, 2005, 2006, and 2007, which indicated a steady trend of conversation activity in the technical forums.

*Connections*. Seventy percent (33/47) of the *Leaders Forum* members (representing primarily BOLC students, $N = 31$) edited their biographical information beyond the basic required information for the registering in the forum. The required biographical information

included rank, branch, duty status, profile (name and email), key words (to be used as search terms when finding people in the forum), and willingness to share knowledge (true/false). Non-required information included 19 additional data entry fields, including spoken languages, expertise, theater deployments, reason for joining the forum, etc. The middle column of Table 5 below shows the percentage of forum members who filled out each of these additional fields.

Table 5. Percentage of Non-required Data Fields Filled Out

| Non-required Data Entry Field | Percentage Data Entry, Non-Required Biographical Information (Total $N = 47$) | Percentage Data Entry, All Data Entry Fields (Total $N = 47$) |
|---|---|---|
| Middle Initial | 74% ($N = 35$) | 74% ($N = 35$) |
| Reason For Joining Forum | 49% ($N = 23$) | 40% ($N = 19$) |
| Mobile Phone | 49% ($N = 23$) | 49% ($N = 23$) |
| Functional Area/MOS | 45% ($N = 21$) | 47% ($N = 22$) |
| Education | 38% ($N = 18$) | 38% ($N = 18$) |
| Grade/Rank or Title | 38% ($N = 18$) | 62% ($N = 29$) |
| Spoken Languages | 36% ($N = 17$) | 36% ($N = 17$) |
| Work Phone | 23% ($N = 11$) | 23% ($N = 11$) |
| Job Experience | 21% ($N = 10$) | 21% ($N = 10$) |
| Theater Deployments | 21% ($N = 10$) | 23% ($N = 11$) |
| DSN | 15% ($N = 7$) | 15% ($N = 7$) |
| ASI | 9% ($N = 4$) | 9% ($N = 4$) |
| Fax | 6% ($N = 3$) | 6% ($N = 3$) |
| Expertise/Competencies | 4% ($N = 2$) | 13% ($N = 6$) |
| Additional Background | 2% ($N = 1$) | 26% ($N = 12$) |
| Title | 0% ($N = 0$) | 47% ($N = 22$) |
| Homepage | 0% ($N = 0$) | 0% ($N = 0$) |
| Fax | 0% ($N = 0$) | 0% ($N = 0$) |
| ICQ Number | 0% ($N = 0$) | 0% ($N = 0$) |

As shown in this column, 14 of the 19 non-required biographical information fields were used. Of these fields, the percentage filled out ranged from 2% to 74%, with the majority (58%) of percentages being 15% or higher. Notably, the Expertise/Competencies field only had a 4% fill rate, whereas Middle Initial field had a 74% fill rate. Alone, however, these unanalyzed percentages did not accurately reflect the degree to which the *Leaders Forum* pilot facilitated the growth of social connections.

First, the user audience should be considered when interpreting what the above metrics mean. For example, the majority of the *Leaders Forum* members in the present sample (46/47) were near the beginning of their Army careers and so likely did not have theater deployments or expertise to report. The relatively detailed background and expertise description provided by the single ANCOC forum member relative to the limited descriptions provided by the BOLC and BNCOC students suggests this is a possibility. Second, some of the important information asked for in the required fields had been entered into the required Keywords field, including entries for MOS, expertise, and additional background. When these entries were taken into account, the percentage of forum members providing information increased. Third, the nature of the

information provided in the non-required data entry fields should be considered. For example, 30% of the additional information provided in the required Keywords field was unrelated to the business of the forum (e.g., "Married" and "thorough and open-minded"). Removing these entries reduced the percentage of forum members providing information. The revised contribution rates are shown above in Table 6 above in the right-hand column. These revised percentages reflect a moderate degree of facilitation of social network growth, but it should be noted that the majority of entries in the biographical information fields were minimal (e.g., one-word entries). Here too, it appears that the students using the *Leaders Forum* effectively learned the mechanics of knowledge management, which was a goal of this pilot forum, but that the development of professional community would require additional effort.

None of the user profiles in the technical forums contained biographical information. The design of the technical forum user profile did not permit the entry or display of such information.

Another reflection of social network development may be found in the referrals that discussants make to themselves or others who could provide additional information or expertise. None of the posts in the *Leaders Forum* referred conversation participants to others. Thirty-eight percent of forum members sampled indicated that they were unwilling to share information, although it should be noted that it is unclear whether this selection was a conscious choice or the unintentional acceptance of a default setting (e.g., some members who selected "false" to characterize their willingness to share information provided contact information). In the sampled discussions in the technical forum, 11% of posts referred others to the poster or some other person for additional expertise or information.

*Context.* Both the eSignal technical forums and the *Leaders Forum* were examined for the presence of "built-in" opportunities to stimulate discussion. Such opportunities stand out in contrast to "organic" conversations that arise out of regular activity in the forum. Instead, built-in opportunities are organized events such as digital stories, book reviews, collective exercises, and the like, which are released in the forum purposefully to generate a shared experience and get conversation going (Cianciolo, Cianciolo, Prevou, & Morris, 2007). Built-in opportunities for discussion may be contributed by facilitators and forum members and help to build professional community and stimulate the exchange of tacit knowledge. Neither the technical forums nor the *Leaders Forum* included these manufactured opportunities. The technical forums did include a small handful of polls, which may be used to give members a sense of their community demographics and opinions, but without discussion these do not serve as a way to generate shared experience.

It should be noted that in some sense the technical forums were not designed to facilitate the development of professional community, but more to serve as information portals for people with explicit technical questions. It may be the case that the purpose of these forums is not served by introducing built-in opportunities for discussion because users have opportunities to develop professional community in other forums, such as *NCO Net*, *PlatoonLeader.mil*, and *CompanyCommand.mil*. Although in a pilot stage, the *Leaders Forum* ultimately is intended to foster the development of community and knowledge sharing skills, so these engineered opportunities will be useful for stimulating activity and shared experience.

*Content.* Two metrics were assessed to explore the quality of the content in the forums. These metrics were selected to determine the relative activity of forum members compared to facilitators in posting content and the degree to which content posted to the forum was actionable. Although it is important for facilitators to post content to a forum, it is an important sign of community health that forum members share the responsibility for disseminating information and solutions. Without this kind of balance, the forum becomes a knowledge repository designed in a top-down fashion rather than an emergent body of knowledge created through professional exchange. Actionable content is content (e.g., a training plan, a presentation, a standard operating procedure, etc.) that is supported with contextualizing information. Contextualizing information is critical for potential users to understand how and when such content may be applied (Dixon et al., 2005) and includes descriptions of what the content is, when it was created, how it was used, who used it, and so on.

In the *Leaders Forum* sample studied, one forum member posted content, but it was not coupled with contextualizing information. In the technical forums no content uploads were made, although several posts included pasted content from external sources or links to external sources. More in-depth analysis of content quality was not conducted because relatively few contributions were made by the samples studied.

*Conversation.* Four metrics were used to assess conversation activity and quality. Conversation activity is reflected in the length of time between posts, particularly posts that initiate a discussion, asking for help or opinions. These posts should be followed up with some kind of acknowledgement and initial comment within 24 hours in order to foster confidence in forum users that the forum can meet their needs. Conversation quality is reflected in the degree to which conversations have a professional tone, reflect the active participation of the community (as opposed to just facilitators), and feature links to one another that represent exchange among professionals. Some additional content analysis based on the rubric presented in Cianciolo et al., (2006) was performed. The purpose of this analysis was to investigate the utility and effectiveness of the conversation.

Of the 179 initiating discussion posts analyzed in this investigation, 44% were responded to within 24 hours, reflecting a relatively low rate of conversation activity (90% or more is ideal). Less than 1% of these posts ($N = 6$) had an unprofessional tone, reflecting a high level of professionalism in this unmoderated forum. Unprofessional tone was defined as saying negative things about another person or group of people. Twelve percent (97/810) of the discussion posts referred to other discussion posts in a thread. In the discussions analyzed, participants seemed to make an active effort to summarize or clarify the discussion by referring to what others said. Seventeen percent ($N = 138$) of posts were made by facilitators, which indicated that the large majority of ongoing discussion was conducted by forum members.

To analyze conversation utility and effectiveness, discussion-initiating posts were first separated according to whether they received a response (no response = 1 post-thread; 1 or more responses = multi-post thread). Next, the initiating posts were categorized into types, corresponding to the post type definitions provided in Cianciolo et al., (2006). These post types were: Invitation to Build "New" Knowledge, Request for Input, Directed Question, Request for Knowledge Resources, Request for Expert, Information Post, and Unknown. Two additional post

types, Rant and Inferred Question, were added for the present analysis. A Rant was defined as a post that points out deficiencies of some kind in a process, policy, or procedure but that is not explicitly seeking feedback or broader opinion. An Inferred Question was defined as a post that does not explicitly ask a question but that indicates the poster is having a problem of some kind, perhaps a form or requesting help that is typical of technical support forums (e.g., "I click the link and it goes to the wrong page."). Table 6 below shows the breakdown of initiating post type within both types of thread (1-post and multi-post).

As shown in the table, 15% (26/179) of the initiating posts asking questions did not receive a follow-up post in the forum. The majority (92%) of these posts were inferred questions, requests for experts, and requests for resources. The majority of initiating posts were followed by a response. The average number of posts in a multi-post discussion thread was 4, ranging from 1 to 55. Directed questions and requests for input were especially effective at generating responses in the forum. Requests for resources also generated a response more often than not, although requests for experts did not.

Table 6. Type of Initiating Posts for One-Post and Multi-Post Threads

| Post Type | # Initiating 1-Post Threads | % of Total | # Initiating Multi-Post Threads | % of Total |
|---|---|---|---|---|
| Directed Question | 0 | 0% | 55 | 36% |
| Invitation to Build "New" Knowledge | 1 | 4% | 1 | 1% |
| Information Post | 0 | 0% | 9 | 6% |
| Inferred Question | 11 | 42% | 16 | 11% |
| Request for Input | 0 | 0% | 39 | 25% |
| Request for Resources | 4 | 15% | 19 | 12% |
| Request for Expert | 9 | 35% | 5 | 3% |
| Rant | 1 | 4% | 6 | 4% |
| Unknown | 0 | 0% | 3 | 2% |
| Total | 26 | 100% | 153 | 100% |

The utility or effectiveness of a multi-post thread was determined by applying the criteria outlined in Cianciolo et al. (2006) for each type of initiating post. The criteria capture whether the multiple posts in a thread adequately addressed the question raised (or information shared) by the initiating post. For example, the initiating post types of Invitation to Build "New" Knowledge, Request for Input, Rant, and Information Post were examined for the degree to which they stimulated participation among the broader population. The initiating post types of Directed Question, Request for Expert, Request for Knowledge Resources, and Inferred Question were examined for the degree to which the question posed was actually answered inside the forum. Using these criteria, 77% (137/179) of the initiating posts were followed by useful and effective conversation.

*Recommendations*

The technical forums have a solid foundation on which to build further participation and to stimulate the evolution of the forums' purpose from technical support to a professional development learning community. Activities that may increase participation in the technical forums should enhance awareness of ongoing activity in the forum, to include featuring new and hot conversations on the main eSignal page and encouraging members to use the forum for professional exchange. LLC staff members who serve as forum facilitators could further fuel activity by conducting periodic needs analyses and addressing these in the forum with "guest" discussants.

The *Leaders Forum* pilot reflects the critical recognition that knowledge management competencies are an important determinant of lifelong learning. The recommendations presented here are intended to help the Fort Gordon LLC develop both the "art" and "science" of the horizontal information sharing process. Two key lessons learned that should be carried away from the current status of the pilot effort are (1) content plays a key role in stimulating discussion and community development; and (2) people use the most expedient mode to communicate with one another. Greater success in stimulating culture shift and adoption of knowledge management would be achieved by using the knowledge management assignment to guide students' interactions with well-established forums that connect them with the larger, distributed professional community.

In order to reduce the likelihood that unproductive conversations are conducted by novice students in the professional community, the assignment could instruct students to pull content from the established forums and then distribute and discuss it in the *Leaders Forum*. Consistent with the current approach, such facilitation could be accomplished in a classroom setting, and could be implemented as a one-day seminar when students are exposed to and enrolled in the appropriate BCKS forums. To stimulate participation, the students could be given class time to explore the BCKS forums, to use the *Leaders Forum* to share what they learned, and to have live conversations about items of particular interest they discovered. Increased levels of instructor moderation of the *Leaders Forum* would also encourage discussion as well as ensure that the culture of knowledge management is understood and adopted by the students.

## Assessment of Leader Education

*The Sample – Signal Captains' Career Course (SCCC)*

The SCCC serves as a representative example for exploring how leader education can be conducted using LLCs. Leader education is a component of most proponent schoolhouse course offerings, so it is useful to understand how the technologies that constitute an LLC not only permit the cost-effective, wide-reaching delivery of course materials but also enable equivalent learning experiences across diverse learning environments. An initial analysis of LLC impact on leader education (intermediate-level education for field grade officers) was presented in Cianciolo (2007), but in that study greater emphasis was placed on the equivalence of learning *content* vice equivalence of *learning experience or environment*. Although the same tasks and standards may be applied to both classroom and blended modes of education delivery,

differences in instructional strategies and learning contexts may moderate educational impact (Clark, 1994; Firdyiwek, 1999). The potential for cost savings associated with delivering blended instruction, such as reduced housing and student compensation costs, is widely recognized. In the present research, it was necessary to explore the application of metrics that capture instructional strategy and learning experience and their impact on learning performance.

Broadly speaking, the SCCC prepares signal captains to lead a company-sized signal unit and to serve as the signal officer (S6) on a combined arms staff (see, e.g., North, 2006). The recently revised SCCC consists of a TRADOC-prescribed common core and seven instructional modules that cover general knowledge (e.g., general leader skills, personnel management, logistics, etc.), signal theory, information technology, information management, Department of Defense communications, network management, and combined arms planning (North, 2006). In the resident version of the course, these topics are covered via a combination of face-to-face lecture, hands on training, practical exercise, and some computer-based instruction. In the blended version of the course, the common core and seven modules are allocated to five phases of instruction--three of which are individual distance learning (Phases I, II, and IV) and two are resident phases held at the Signal Center (Phases III and V)--and a single block of self-development.

*Assessment Questions and Method*

In the present research, outputs and outcomes associated with equivalence of resident SCCC and blended (distance learning + resident) SCCC were explored in order to determine the educational impact of delivering leader education via a combination of resident and distance learning (DL) formats. Specifically, the following questions were asked:

- Question: Does administering the SCCC online enable uniform access to training content?
  - Metric: Content equivalence across resident and online learners
  - Metric: Instructional strategy equivalence across resident and online learners
- Question: Does administering the SCCC online produce uniform learning performance across resident and online learners?
  - Metric: Performance equivalence across resident and online learners

A combination of methods was used to explore these questions, including interviews, archival data analysis, focus groups, and classroom observation. Interviews were conducted with two instructors who oversaw SCCC-blended, including administration, content delivery, and performance evaluation during both distance learning (DL) and resident phases of the course. One of these instructors also conducted performance evaluation during the capstone exercises of SCCC-resident. Brief, informal discussions also were held with two SCCC course developers and a more in-depth discussion was held with an Army Training and Doctrine Command quality assurance officer who was concurrently evaluating the content equivalence of SCCC-resident and SCCC-blended. Overall, the purpose of these interviews was to determine the nature of instruction in the two versions of the SCCC.

Archival data analysis consisted of examination of the SCCC-resident and SCCC-blended programs of instruction and course "crosswalk" diagrams.[9] Also studied was the course map for SCCC-blended. The purpose of the archival data analyses was to explore the content equivalence of SCCC-resident and SCCC-blended. An additional purpose was to determine the different modes of instruction (e.g., hands on training vs. equipment simulation) used to deliver SCCC content (i.e., instructional strategy equivalence).

Two focus groups ($N = 7$ and $N = 8$) were conducted with SCCC-blended students. The purpose of these focus groups was to explore further instructional strategy equivalence. The questions asked of focus group participants centered on their experiences during the distance learning phases of the course. Specifically, the questions asked about (a) interactivity among students and with the instructor while distributed; (b) usability/access issues associated with online content delivery; (c) impressions of content, delivery, and learning achieved; (d) tradeoffs involved in completing coursework at home vs. at a schoolhouse; and (e) participation in the block of voluntary self-development courseware.

Classroom observations were conducted during the combined arms staff exercise held at the end of both SCCC-resident and SCCC-blended. In the combined arms staff exercise, students role-played the members of a Stryker Brigade Combat Team staff and conducted the military decision-making process to form a plan for addressing stability operations in Azerbaijan. The mission analysis brief and course of action brief of two groups of SCCC-blended students and one group of SCCC-resident students were assessed using the Tactical Thinking Behaviorally Anchored Rating Scales (Phillips, Ross, & Shadrick, 2006) as a guiding framework. Specifically, the briefs were assessed for the stage of cognitive development (novice, advanced beginner, competent, proficient, and expert) reflected in the slides presented and associated discussion. General observations were written down and then collectively associated with a stage of development.

It should be noted that the sample of SCCC student groups interviewed and observed may not be representative and that a larger sample is desirable for drawing strong conclusions. The findings based on this sample are consistent with previous research, so it is possible to conclude that this sample is not an outlier.

*Summary of Findings*

The present analysis indicated that blended learning solutions, partially hosted in the Fort Gordon LLC, enabled roughly uniform distribution of leader education content across learner types. Variation in learning experience across each type of learner was identified, however this dissimilarity did not appear to create meaningful differences in performance during the capstone exercise observed. Student groups having received both types of instruction demonstrated novice levels of performance, with slightly more advanced cognitive development demonstrated by the resident group. The blended group did require coaching, however, in order to match the level of performance demonstrated by the resident group.

[9] Crosswalks compare both versions of the course, showing areas of shared/unique topic coverage and similarities/differences in recommended hours for completion.

Differences in learning experience stemmed primarily from a lack of interactivity among the student and his or her instructors and peers during the DL phases of blended instruction and from a lack of incentives and processes in place to reward effective self-instruction strategies for distance learners. As noted in Leonard, Winkler, Hove, et al. (2001), implementing procedures for resourcing, supporting, and encouraging at-home instruction is a critical contributor to the success of DL. Although the performance implications associated with unequal learning experiences were not seen in the present research, learner dissatisfaction with DL may foster negative attitudes towards the capability of the Army to train effectively and the Army's motivations for providing training at home. Negative attitudes such as these may reduce affective organizational commitment and individual readiness.

*Detailed Findings*

*Equivalence of Course Content.* Examination of the program of instruction for both versions of the SCCC largely indicated course content equivalence. That is, the same course content was *made available* to all learners, regardless of location, and involved roughly the same amount of recommended hours (760 hours for resident, 670.5 hours for blended)[10]. Differences in course content *actually received* arose when (a) there were usability or access problems with the distance learning technologies; and (b) required components in the resident version of the course were voluntary in the blended version of the course.

First, interviews with instructors revealed that the TRADOC-prescribed common core component, administered online for students taking the blended version of the course, had so many technical problems that many students have been allowed to graduate without having completed the common core. The TRADOC prescribed common core accounts for 64 hours of instruction (18 topics), covering branch-general topics such as equal opportunity, law of war, and information assurance. Resident students, in contrast, take the common core via computer-based instruction delivered in the schoolhouse, avoiding online delivery problems. For this reason, resident students complete this component of the course whereas blended students may not. Students interviewed in focus groups most frequently reported that they had begun the SCCC prior to its conversion to the five-phase format in 2006, so they did not take the common core online. Of two interviewees who did report taking the common core, one reported significant technical difficulty and one did not. Focus group participants also reported technical difficulties when accessing other online portions of the course, but these problems did not prevent them from completing the coursework.

Second, some components of the seven instructional modules were taught in a classroom setting for resident students whereas SCCC-blended students received these same components as voluntary self-development (totaling about 161 hours of instruction). It may be the case that distance learning students complete the voluntary self-development, but given the large number

[10] Differences in hours between the two versions of SCCC do not reflect the subtraction of a particular annex or annexes of instruction. Rather, small differences accrue over content areas such that although SCCC-blended has more recommended hours for some topics, SCCC-resident overall has a greater number of recommended hours. In general, SCCC-blended topics taught in residence have several fewer (~40 hours per topic) recommended hours than the same topics taught in SCCC-resident. This difference enables SCCC-blended students to return more quickly to their civilian jobs and families.

of hours necessary to complete the required distance learning coursework in the context of civilian job and Family demands, it is likely that few actually do. Focus group participants unanimously reported that they did not complete any of the self-development coursework. Some of the people interviewed did not know that such coursework was available.

For these two reasons, differences in course content actually received represented somewhere between 161-225 hours of instruction and, more importantly, 16-34 content topics. It should be noted that prior to the introduction of online instruction, the non-resident portion of the blended-SCCC was conducted via mail correspondence. The course was conducted in two phases instead of five, with the second phase conducted in residence at Fort Gordon over two weeks. Blended-SCCC students received a great deal less content than resident students, and what content they received was strictly text-based without interactivity. In focus groups and interviews, this educational context was reported as less preferable by students and course developers alike. Lack of equivalence in course content among the two current versions of the SCCC should be considered in this light.

*Equivalence of Instructional Strategy*. The application of an effective instructional strategy that leverages technical capability is critical for achieving the educational impact made possible via blended learning solutions for leader training (Clark, 1994; Firdywik, 1999). In the case of blended learning, the conditions must be set for effective self-instruction strategy. Leonard, Winkler, Hove, et al. (2001) outlined five methods for ensuring the effective implementation of blended learning, as follows:

1. Carefully selecting segments of instruction amenable to instructorless or distributed learning
2. Using appropriate and relevant instructional media
3. Ensuring that sufficient changes are made to existing processes and support activities (e.g., to enable instructor support for online learners)
4. Providing adequate resources to implement blended learning (e.g., technology, technical support personnel)
5. Providing sufficient incentives for students, commanders, and supporting activities (e.g., human resources) to play their proper roles

Although not all of these methods are conventionally associated with instructional strategy, they do affect the quality of self-instruction through the availability of (a) quality courseware; (b) instructors and other support to interact with distributed students; and (c) time set aside specifically for online learning.

Examination of the methods used to convey course content indicated rough equivalence between the resident and blended SCCC. First, segments of the curriculum that required group exercises and collaborative learning (e.g., staff exercises, network management) were conducted as resident phases in blended-SCCC, with individual leader and technical skills (e.g., staff knowledge, signal theory) reserved for online instruction. Online instruction largely was delivered via narrated PowerPoint lectures and interactive courseware, including some equipment simulation, reflecting the appropriate media selections.

Despite the application of these methods, significant differences in learning experience did exist, and were related to both the instructorless nature of the DL segments of the course and the instructional media used. One noteworthy difference between the two versions of the SCCC was the degree of student interaction with instructors and with each other while learning the content covered in the online phases of the blended SCCC (Phases II and IV). Students in both focus groups unanimously agreed that greater interaction, particularly with instructors, during the distributed phases of instruction would be desirable. Specifically, they reported being more engaged by "authentic" or generative assessment activities (e.g., creating a memorandum) in which they produced an actual leader product and received feedback directly from the instructor. They did not feel that the assessment activities in the interactive courseware were useful for their learning or retention. They reported that these assessments were too easy to answer correctly without complete knowledge or proficiency with the content. Students also reported technical difficulties with scoring interactive courseware assessments, such that correct answers were counted as wrong and vice versa.

Students also desired greater interactivity with each other through group assignments on leader tasks not currently covered by the instruction. They did not wish for synchronous interaction, citing scheduling challenges associated with conducting widely distributed group activities. Nor did they wish for longer resident phases. Rather, they expressed a desire for content that was more targeted to their needs as leaders and managers and for interaction with others as appropriate to facilitate such learning. The collaborative capabilities of the software used by the Fort Gordon LLC to deliver curriculum materials (i.e., Blackboard) permits discussion and community development among distributed learners, although it is not currently used in this way. Proactively leveraging collaborative capabilities may enhance the social aspects of distance learning, provide a straightforward way for students to find and help each other, and may increase the number of SCCC-blended students who actively engage in course materials through interaction with the instructor.

Another important difference observed between the learning experiences of resident- and blended-SCCC students was tied to the methods noted by Leonard, Winkler, Hove, et al. (2001) that relate to providing support and incentives to enable online instruction. Specifically, students reported not being compensated for the time they spent completing online coursework, nor were they given set-aside training time by their commanders or employers to focus on education. As a result, students completed the minimum necessary amount of course content as quickly as possible when they could work it around other demands. The methods they reported using included: staying up late, taking vacation or sick days off of work, putting off instruction until the last minute and cramming, and simultaneously doing coursework and recreational activities (e.g., watching TV). Focus group interviewees unanimously felt that non-resident instruction was beneficial but that the way it had been implemented placed a significant burden on the learner. Although it was not explicitly assessed as part of this research effort, it is likely that such a belief would not enhance affective organizational commitment, and could possibly have a negative impact.

Similarly, instructors did not receive assistance or time set aside for actively facilitating online learning, which can be very time consuming but essential for effective distributed instruction (Abell, 2000; Hiltz, 1998; Kreijns, Kirschner, Jochems, 2003). The current design of

most of the online courseware used in blended-SCCC obviates the instructor except as a course administrator. Although it is recognized that instructorless education would save money, there is a potential cost-benefit tradeoff that is worth exploring.

*Equivalence of Learning Performance.* The revealed differences in learning experience raise questions about the equivalence of learning performance across resident- and blended-SCCC students. As described previously, both resident- and blended-SCCC capstone staff exercises were observed in order to investigate learning performance. This exercise was selected because it was held at the end of the course, thus increasing the likelihood that any observed differences would be due to prior instruction. In both the resident and blended versions of the SCCC, the combined arms staff exercise follows training in staff knowledge and requires students to play staff roles with which they may be unfamiliar. The mission analysis and course of action development phases were observed, along with their associated briefings to the instructor.

Some differences in how the capstone exercises were conducted for resident- and blended-SCCC students should be described. First, blended students were allocated one less day to complete the exercise. These students made up for the missing day by working longer hours on the days they conducted the exercise. The result was that resident students worked for five, approximately 8-hour days and the blended students worked for four, approximately 10-hour (and sometimes longer) days. Second, the instructor was much more involved in guiding the exercise and providing mentorship with blended students than with resident students. Third, the two blended student groups observed ($N = 7$, $N = 8$) were slightly smaller than the resident student group ($N = 9$) and the resident group had a foreign national student from Azerbaijan, the country serving as the area of operations for the exercise. Fourth, the groups had differing numbers of members who had served on a battalion staff ($N = 4$ and 2 for the blended groups and N = 1 for the resident group). Fifth, and finally, the groups differed in how seriously they took the exercise. The resident group was much more relaxed and unconcerned about their performance than either of the two blended groups to whom it meant a great deal to perform well.

Table 7 below shows examples of the behaviors sampled during classroom observations and the assignment of a level of cognitive development. As shown in the table, the performance of both groups largely reflected reliance on rules (e.g., doctrine, the operations order), variability in analytical capability, and focus on key mission factors somewhat in isolation. According to Phillips, Ross, and Shadrick (2006), these behaviors reflect a "Novice" level of cognitive development. A Novice level of cognitive development is to be expected from the students at this stage in their careers given very limited experience with the military decision making process and combined arms planning. Students at this stage had not yet acquired the knowledge that enables more analytical and flexible thinking, and were asked to play roles that they will not play in the operational environment.

One exception to this observation was course of action development as conducted by the resident students. In this phase of the exercise, the resident students demonstrated some ability to recognize meaningful elements in the information provided and specify their implications, particularly for enemy action. They also went beyond established rules to address unknowns

about enemy strength. For this reason, their performance in this phase was assigned an "Advanced Beginner" rating.

Table 7. Capstone Exercise Performance of Resident- and Blended-SCCC Student Groups

| Student Group | Exercise Phase | Example Behaviors | Level of Cognitive Development |
|---|---|---|---|
| Resident | Mission Analysis (MA) | - High-level descriptions of geography, population, and political/economic situation (i.e., regurgitation of operations order)<br>- Limited enemy analysis (i.e., goals not explicitly stated)<br>- Battlefield effects analysis identified most key implications of weather and terrain<br>- Facts and assumptions moderately well identified and articulated<br>- Implied, specified, and essential tasks reflected some conflation of the mission and essential tasks, some overlap in specified tasks among warfighting functions, recognition of constraints satisfactory<br>- Some assumptions reflected lack of knowledge | Novice |
| | Course of Action Development (COAD) | - Implications of enemy courses of action well articulated<br>- Good analysis of enemy patterns<br>- Enemy adaptations to friendly strengths seen as "weaknesses" instead of thinking enemy tactics<br>- Effective analysis of differing tactics among differing threat groups and most likely and dangerous COA<br>- Modified force ratio matrix to address unknowns<br>- Evaluation criteria with arbitrary weights that couldn't be justified | Advanced Beginner |
| Blended | Mission Analysis (MA) | - Significant amount of time (1+ hrs) spent reading doctrinal manuals prior to beginning analysis<br>- Some conflation of facts and tasks<br>- Instructor provided guidance on considering all assets, information requirements, and facts vs. assumptions<br>- Slide organization deviates from normal procedure, presentation somewhat confusing<br>- Commander's Critical Information Requirements cut and pasted from OPORD<br>- One group to do significant revisions of MA brief<br>- Restated mission one level of analysis too high | Novice |
| | Course of Action Development (COAD) | - Instructor advised students not to exert command and control too many levels down<br>- Conflation of the mission, purpose, and tasks to be accomplished with the COAs<br>- Levels of analysis at the platoon level (i.e., too low)<br>- Good evaluation criteria | Novice |

The data in Table 7 suggest that there was little practical difference in the performance of blended- and resident-SCCC students. Students achieved similar levels of performance, although blended student groups received a great deal more mentoring and guidance from the instructor to

achieve the level of performance they did. One of the blended groups had to redo significant portions of their mission analysis before completing their brief to the instructor.

*Recommendations*

Solutions for building interpersonal interactivity into online courseware generally are not simple, nor are they inexpensive. Instructor time is required for collaboration and additional course developer time (and expertise) is required to build computer-based training that has interactivity as its key mode for delivering instruction and conducting assessment. Blackboard currently supports interactivity among instructors and students, but procedures must be put into place and faculty developed in order to leverage these capabilities. In the case of leader education, as in the case of MOSQ instruction, the development of instructors, course developers, and the overall technology-assisted instruction process can only be accomplished through close coordination and well-defined roles among resident instruction managers and the LLC staff. In the MANSCEN LLC, courseware development is a critical function of the LLC staff, a model potentially worth exploring for the Fort Gordon LLC.

## Assessment of On-Demand Training

*The Sample – Mobile Training Teams and Unit Universities*

As stated previously in this report, much of what the Fort Gordon LLC offers to lifelong learners may be considered training on demand. Simulation downloads, online courseware, and discussion forums all enable 24/7 access to learning content at the initiative of the learner. However, in order to clarify the presentation of this report, these aspects of the Fort Gordon LLC have been considered separately. Mobile training teams and Unit Universities represent outputs uniquely produced by the Fort Gordon LLC, whereas simulations, blended learning, and knowledge management have been implemented extensively throughout the Army. For this reason, mobile training teams and Unit Universities require their own, novel assessment criteria and focused analysis.

The critical function served by On-Demand Training is the provision of MOS sustainment training independently of the institutional education cycle. The purpose of On-Demand Training is to support the Army's apprenticeship model of instruction, enabling pedagogically sound and technologically advanced on-the-job training. It is possible for On-Demand Training to improve the cost-effectiveness of training, but it is more important for enhancing mission readiness because it serves as an alternative to institutional modes of instruction. Enhanced mission readiness stems from the accelerated skill development and increased retention enabled by just-in-time instruction.

*Assessment Questions & Method*

The present research assessed the output and outcomes associated with the use of On-Demand Training for enhancing proponent outreach. Specifically, the following questions were asked and associated metrics used to focus data collection:

- Question: Is On-Demand Training being adopted?
  - Metric: % of target audience registered to use the system
- Question: Does On-Demand Training enable just-in-time learning?
  - Metric: % of registered users who state that training received was timely and could not have been possible any other way
- Question: Is On-Demand Training cost-effective?
  - Metric: Reduction in cost to conduct mobile training teams before and after LLC implementation

These questions were answered through a combination of interviews and review of archival data. Interviews were conducted with the Fort Gordon LLC Extension Campus Coordinator, the LLC Program Manager, the Signal Center Chief of Resident Training Management, the Chief of the Training Development Cell located at the Signal Center NCO Academy, and ten training supervisors who established or oversaw Unit Universities with the Fort Gordon LLC. Interviews with training supervisors were conducted in order to capture concrete information about how the Unit Universities enabled just-in-time training and enhanced readiness. Archival data reviewed included cost-effectiveness analyses conducted by the Fort Gordon LLC staff and mobile training team cost data provided by the Signal Center Chief of Resident Training Management.

Interviews conducted with Unit University training supervisors represent a relatively modest sample due to several factors. First, three Unit Universities were used to conduct non-resident 25B10 instruction (i.e., they supported the High-Tech Regional Centers at Tobyhanna and Sacramento and the Professional Education Center in Little Rock), which was discussed previously in this report. These Unit Universities were not considered part of On-Demand Training, bringing the sample number down to 44. Second, of the seven original Unit Universities (up and running by November 2006), two of the associated units had been deactivated. Third, of the remaining 42 Unit Universities, 18 training supervisors were contacted and eight did not respond to a request for an interview. Fourth and finally, of the ten training supervisors contacted, five indicated that their Unit Universities were too recently established to have much to say about impact. Because the remaining 24 (42-18) Unit Universities had also been very recently established, further attempts to contact training supervisors were suspended.

*Summary of Findings*

Unit trainers interviewed unanimously and enthusiastically endorsed the importance of Unit Universities to enhancing their units' mission readiness. The LLC staff has launched as many Unit Universities as personnel and hardware limitations would allow, with recent upgrades to hardware poised to accelerate the process in the immediate future. Most of the unit trainers interviewed had newly established Unit Universities, but easily cited the ways in which they thought training on demand would provide unique and cost-effective opportunities for refresher and new equipment training. Mobile training teams supported by the LLC technologies enabled at least partial cost reduction to the Signal Center's ongoing efforts to reach out to operational units in need of pre- and post-deployment training. The delivery of training to a deployed unit via a virtual mobile training team represented a unique mode of proponent outreach that made

cost-effective use of existing LLC personnel and schoolhouse experts through close coordination.

Kinney (2005) presented some external factors that unit trainers cited as important for enabling lifelong learning in units. Among these factors were time to train, command emphasis, and incentives to train during down time. All three of these factors also were cited by interviewees as currently limiting the impact of Unit Universities. Other limiting factors cited by unit trainers were lack of awareness of Unit Universities and the difficulty associated with acquiring course content that is not readily available online. Although the first three factors are outside the sphere of influence of the LLC and the Signal Center, these additional factors are not. They could be addressed through closer coordination among content developers and providers and increased marketing outreach of the lifelong learning concept.

*Detailed Findings*

*Adoption of On-Demand Training.* At the time this analysis was conducted, the Fort Gordon LLC hosted 47 Unit Universities. The Extension Campus Coordinator estimated that 180 Unit Universities would be necessary to reach every unit in the Signal Corps and that more than 600 would be necessary to reach signal and non-signal units who could benefit from reach back to the Signal Center. Forty-seven Unit Universities represents approximately 30% of the Signal target audience and 8% of the Army-wide target audience, a modest percentage that has grown significantly in the past year (1% to 8%). According to the LLC staff interviewed, constraints on the growth of the Unit University initiative have been due largely to limited server space to host Unit Universities (which produced concerns about backup activities) and lack of staff time available to get the word out about On-Demand Training. Both LLC staff members interviewed reported a surge in interest in Unit Universities following visits by the former Deputy Chief of Signal to bring word of LandWarNet eSignal to operational units. Recent acquisitions of new hardware should enable the hosting of more Unit Universities. If the present rate of growth (i.e., roughly six times the number of Unit Universities in one year as were present the year previous) continues, the Army-wide target audience should be reached within approximately 2 years. A more realistic estimate, given current limitations in personnel and courseware availability would probably be about 10 years.

It is difficult to estimate an appropriate adoption rate for mobile training teams, given the spontaneous nature of requests for On-Demand Training and the potentially very broad target audience. For live mobile training teams, LLC capabilities are used more as a facilitative capability (i.e., to save printing and reproduction costs) than as an enabling capability (i.e., making it possible to send out a mobile training team). The Signal Center Chief of Resident Training Management stated that it can be most cost-effective to conduct training at the schoolhouse, so emphasis is placed on maximizing the ability of units to come to Fort Gordon. For this reason, effective use of the Fort Gordon LLC to deliver blended learning, among other services, may actually help *reduce* the frequency of mobile training team deployment.

One way to estimate the adoption rate for virtual mobile training teams is to compare the frequency of usage compared to live mobile training teams. The Chief of Resident Training Management reported that since October 2005, the Signal Center sent close to 20 live mobile

training teams per year. Since its inception in 2002, Fort Gordon has deployed one virtual mobile training team. As with Unit Universities, staffing shortfalls and limited marketing activity appear to have contributed to modest adoption rate. It is not widely known that the Fort Gordon LLC can provide virtual mobile training teams. Even so, significant, close coordination among LLC staff and Signal Center instructors and course developers would be necessary to prepare the appropriate training content.

*Just-in-time training*. Of the ten Unit University training supervisors interviewed, five indicated that their Unit University was too newly established to yet have an idea of its impact. Nine of the 10 interviewees were very enthusiastic about the possibilities for their Unit University to enable MOS sustainment training and reach back to the schoolhouse.[11] These interviewees reported that they established a Unit University to enhance mission readiness through (1) training on new equipment assigned to the unit; (2) training on MOS-specific skills that were needed for deployment, but that could not be trained feasibly in the schoolhouse (e.g., not enough seat reservations); (3) increased confidence enabled by reach back to Signal Center resources; (4) reinforcement of existing theory or skills; (5) reduced time away from the unit for training; and (6) reduced training cost.

It is important to note that the motivation to establish Unit Universities appeared to have come from a need to enhance readiness more directly than by improving personnel or training percentages as stated in a unit readiness report. Improving, for example, a personnel percentage requires that the number of duty-MOS-qualified Soldiers in a unit changes. Such a change requires institutional education conducted either entirely at the schoolhouse or provided as a blended learning solution or mobile training team. The Unit Universities of nine of the ten training supervisors interviewed were established rather as workarounds to the challenges of going through the formal educational system in a timely fashion. The nature of how readiness is enhanced by On-Demand Training further highlights the unique characteristics of this initiative and its ability to provide training that could not be conducted in any other way.

That said, the established Unit Universities have not yet achieved optimum effectiveness in enhancing just-in-time competency, as reported by the training supervisors interviewed. The primary barriers to effectiveness that they listed were (1) limited time to conduct on-the-job training; (2) lack of incentives for conducting additional training outside of daily duties; (3) lack of command emphasis on using digital training for augmenting work performance; and (4) challenges getting schoolhouse courseware released online or getting special purpose courseware created. The majority of these barriers are beyond the direct sphere of influence of the LLC, although initiating and maintaining the development of social networks among itself, unit commanders, and schoolhouse education providers will be critical for facilitating the delivery of training on demand and ensuring it will be used.

*Cost-effectiveness*. The total cost of sending mobile training teams (MTTs) varies a great deal, depending on the location where the team is to be sent (costs include travel and possibly

[11] One of the ten interviewees was using his Unit University to deliver the non-resident Sergeants Major course. He was also very enthusiastic about the capabilities of his Unit University, but from the stance of providing institutional instruction rather than just-in-time training. Fifteen percent (7/47) of Unit Universities are used to support blended learning for institutional education.

hazardous duty pay), the duration of the training (instructor costs), the number of students (instructor and printing and reproduction requirements), and equipment requirements. The Fort Gordon LLC can assist with reducing these costs by making course content available online, thereby reducing the printing and reproduction costs of conventional MTTs, or by providing training virtually (i.e., virtual MTTs). Both types of MTT have been deployed by the Fort Gordon LLC.

MTTs with training content (e.g., lecture slides) hosted in an LLC represent relatively a minor reduction in cost, printing and reproduction only. In this case, instructors still must be sent to the training location, as (potentially) does the equipment. The feasibility of sending a mobile training team therefore is a function of the number of students who need the training and the readiness cost (i.e., time away from unit) associated with sending these students to the schoolhouse, where equipment and instructors are already located, or deploying these personnel without the training. One conventional MTT enabled by the Fort Gordon LLC was sent to Fort Hood, and one to be sent back to the same location was determined to be infeasible given the relatively small number of students. Factors therefore somewhat beyond the sphere of influence of the LLC (i.e., availability of equipment at the unit to be trained and instructor costs) ultimately determined the deployability of a conventional MTT.

Since its launch in 2002, the Fort Gordon LLC has deployed one virtual mobile training team. As presented in the Fort Gordon LLC VIP brief, a unit in Iraq discovered that it had to work with a piece of satellite communications equipment with which it was completely unfamiliar. The unit requested training on this equipment in order to successfully move, operate, and maintain the equipment. In two weeks' time, the LLC staff, together with instructors at the Signal Center, developed videotaped demonstrations of how to perform the required functions and hosted it online through the LLC along with operation manuals, maintenance manuals, and instructor slides and notes. The estimated cost savings associated with conducting the training virtually was more than $400,000.

Present examination of archival cost estimates for sending a MTT to Iraq indicated that the vast majority of the costs incurred by such a team would be personnel salary and travel costs. Blended learning solutions that have been piloted to conduct 25B10 MOSQ instruction with the National Guard demonstrates an option for decreasing the actual costs of deploying virtual mobile training teams by reducing the duration of the team's deployment. In any case, a cost approaching $400,000 to send a mobile training team to a hazardous area such as Iraq, raised the question of how often this occurs and therefore how many opportunities an LLC has to reduce costs by providing virtual teams instead of live ones. The Fort Gordon LLC has not had the opportunity to provide another virtual mobile training team (instead of a live mobile training team) in the six years it has been established. This reality highlights the importance of LLCs and virtual mobile training teams to making training possible, perhaps more so than saving money to conduct training.

*Recommendations*

The impact of On-Demand Training on mission readiness and cost savings is a direct function of the adoption of the Fort Gordon LLC by units in the field. Increased adoption of Unit

Universities and virtual mobile training teams will improve the likelihood that skills can be acquired or refreshed just in time and enhances the effectiveness (both in terms of pedagogy and resource requirements) of proponent outreach to lifelong learners. The rate of expansion of Unit Universities suggests that the adoption of On-Demand Training is accelerating, but also that there are opportunities for the Fort Gordon LLC and Signal Center to extend their outreach through increased marketing activities.

In order to fully understand the readiness impact of Unit Universities, some follow-up research is necessary. This research should be facilitated by the LLC staff through working documentation of the following information:

- A history for each Unit University (i.e., how/why it was established, how long it took, how the requester heard about LandWarNet, etc.)
- The training content hosted in each Unit University
- The history of the training content (i.e., whether it was developed specifically for the Unit University or collected from an existing source, the social networks involved in making the content available, etc.)

In addition, it would be beneficial if the LLC staff conducted periodic follow-up phone interviews with the training supervisors in charge of the Unit Universities so that stories of how the system is working and what the challenge areas are can be collected and acted upon. Documentation of the external factors that limit the impact of Unit Universities may support efforts to exact change in other areas that could make training more adaptive and flexible in the future.

## LLC SELF-ASSESSMENT

LLC self-assessment enables TRADOC to leverage the findings of this ARI program of research in order to develop the lifelong learning initiative well into the future. For this reason, effort was devoted to exploring the requirements for conducting LLC self-assessment using the revised assessment framework and analyzing the feasibility of these requirements. The goal was to develop a plan for conducting LLC self-assessment that could be readily adopted and also produce meaningful data about learning effectiveness and organizational impact. Assessment lessons learned throughout the research program were collected to assist in forming this plan and are summarized below.

### LLC Assessment Lessons Learned

*Lesson #1 – The Rate of Change in LLC Activities and Outputs is Very High*

As described previously, interpreting the results of LLC assessments must take into account the fact that LLCs change rapidly and often. Among the LLC characteristics that change are:

- Terminology: The use of multiple terms to refer to the same things (or vice versa, to use the same term to refer to multiple things) is widespread. For example, the Fort Gordon

LLC also is known to various users as the University of Information Technology, LandWarNet e-Signal and LandWarNet eUniversity. Other multi-use terminology includes referents to modes of delivering instruction (e.g., distributed vs. distance learning vs. blended learning and simulation vs. simulator vs. courseware), which often are used independently of their definitions.

- Courses offered: LLCs are characterized by significant, responsive growth to training and education requirements that emerge from both proponent schoolhouses and the field. The result of this adaptivity is the emergence of different types of courses which are best delivered using different types of instructional strategy, educational technology, and, of course, different content. The LLCs adapt in response, adding new components, modifying interface layouts, and changing technical capabilities.
- Support infrastructure: Since the Signal Center's University of Information Technology was established as the first LLC and the initial executive agent for the lifelong learning initiative, several changes have been made regarding where strategic planning and decision making are executed. The location and means for providing server support and technical assistance also have undergone change, with plans for further evolution.
- Use practices: The use of LLCs (and, by extension, interface their layouts) evolves as the technical staff, instructors, course developers and other stakeholders develop processes for working together and enhance their ability to leverage the technologies involved. Other driving forces behind change in use practices involves the integration of additional stakeholders who enhance LLC functioning, such as faculty developers, quality assurance professionals, marketing personnel, course administrators, and so on.
- Personnel: LLCs are run by contractor personnel, which change at least on a periodic basis when a challenger successfully wins a re-compete. Changes in contractors generally do not involve a complete turnover in personnel, but what change in personnel does occur results in process and data loss as new hires are brought up to speed.
- Assessment goals: As LLCs evolve, the reason for assessing them changes, as does the target of assessment. Assessment that was initially conducted to justify the existence of a particular LLC (or of the broader LLC concept) may later be conducted to evaluate the impact of introducing specific technologies, faculty development interventions, support infrastructure modifications, or other initiatives. As LLCs become broader in scope, the assessment spotlight may shift across components because an assessment of all components simultaneously would be too labor intensive.
- Technology: The technology used as the backbone of LLCs is always subject to change. Existing technologies may be substituted by more cost-effective or powerful alternatives. New technologies may be added to leverage advances in capability or to enable the achievement of newly identified learning objectives. Individual proponents may augment the LLC foundational technology with applications of their own in order to meet the particular needs of their learners.

*Lesson #2 – The Assessment Methods Necessary to Capture Meaningful Data Require a "Human in the Loop"*

A range of methods may be used to capture assessment metrics, including system analysis (e.g., content analysis of discussion forums), surveys, interviews, focus groups, archival data analysis (e.g., financial data, programs of instruction, course grades, etc.), and classroom

observation. Unfortunately, none of these methods are suited for full automation for the following reasons:

1. Although the LLC Assessment Framework identifies metrics that will provide information about what data to collect, a person is needed to develop the measures used to capture metric data. Reuse of such measures as surveys, interview and focus group protocols, observer checklists, content analysis rubrics, etc., is possible, and recommended as a means of partial automation, but some modification will be necessary over time to address the kinds of changes described above.
2. Some data may be collected automatically (e.g., survey data), but most methods require a person to gather data from other people (e.g., interviews, focus groups, classroom observations). There are methods for partially automating this process, for example, providing means for users to submit comments and feedback instead of conducting interviews or using grades instead of classroom observations. The tradeoff associated with partial automation is between information volume and ease of administration. Generally speaking, the easier it is to administer a measure, the less information it provides. A human is required to judge the cost-benefit tradeoff of selecting among assessment methods.
3. Metric data come from numerous sources, requiring the participation and support of people both within and outside the proponent schoolhouse. Automated data collection likely would require the integration of multiple data sources including not only databases (automated and human-manipulated) but also paper-based repositories. A person would be necessary to integrate the information from these numerous sources.
4. Once metric data have been captured, a person is required to analyze and interpret the data. Survey software can automatically summarize response data, for example, but it cannot identify the implications of these data for the functioning of the LLC. Similarly, activity data may be collected automatically by LLC technologies, but these data paint only a partial picture of effectiveness and impact. Several data inputs must be analyzed and integrated to fully understand LLC functioning.
5. Interpretation of metric data also needs a human to specify the caveats to generalizing and acting on the findings. For example, a person must be involved in determining whether a representative sample was used for classroom observations and, when the sample is not representative, what limits are placed on where or when the findings apply.
6. Finally, a person is required to communicate the assessment results to others. At some point in the distant future, dashboard technologies (requiring human data entry and/or significant database integration) could be designed to support the flexible and broad reporting of assessment results. The design of such a dashboard, however, requires a more stable assessment context than is currently the case for LLCs. Assessment metrics must be extensively validated and widely accepted before serving as the design basis for an assessment dashboard.

*Lesson #3 – Face Time is Critical for Conducting Assessment*

Face time is critical for conducting assessment for multiple reasons. First, visits to the proponent schoolhouse and interviews with key stakeholders are required to fully understand the complexities of that proponent's LLC. Although on paper LLCs share the same basic

technologies, functions, and goals, LLCs differ widely in their histories and particular areas of emphasis. Physically being present at the schoolhouse facilitates contact with a larger and more representative sample of people involved in running the LLC and providing instruction. Stakeholders overlooked by an assessor who has not visited the proponent could potentially provide useful information or could provide access to additional people of which the assessor was unaware. When the connections among stakeholders and other people with information arise during site visits, it is a simple matter to capitalize on such networks by setting up meetings or dropping by an office. Personal introductions facilitated by stakeholders increase the likelihood of a productive exchange with people unfamiliar with the assessor.

Second, face-to-face meetings help to build trust on the part of stakeholders and other providers, which, in an evaluative context, may not come easily. Multiple meetings often are required to gain access to people and data that can present the most complete picture of LLC functioning. Periodic, face-to-face updates to stakeholders and providers on assessment findings go a long way toward ensuring shared understanding of how the program is doing and achieving mutual satisfaction with how results are presented. Email, phone and, to some degree, videoteleconference contact among assessors, stakeholders, and other providers reduce the observability of visual cues of discomfort with the process and therefore prevent opportunities to amend one's approach. In addition, physical distance between these people makes the assessor seem more remote, allowing interpretations of the assessor's motives to become more subject to the concerns and unverified assumptions of the people whose program is being assessed.

*Lesson #4 – Collecting Readiness Data Requires Extensive Field Work*

Aside from theoretical, proxy measures of readiness, such as organizational commitment (e.g., McGonigle, Casper, Meiman, Cronin, Cronin, & Harris, 2005), there are two ways to collect readiness data. First, organizational-level readiness data, such as personnel and training readiness status, may be collected via queries of various Army databases. Directly querying these databases necessitates the appropriate authority and need to know, which typically is reserved for investigators from within the Army or those research institutions closely affiliated with it (e.g., RAND Corporation, Institute for Defense Analyses). Without this authority and affiliation, extensive social networks are required to collect the same data indirectly. Such social networks must involve well-established relationships with Army personnel and/or large contractors who work actively with the necessary databases and are willing to support the investigation.

Second, the collection of unit-level readiness data, such as time to competency, requires close contact with unit trainers and commanders in the field who receive graduates and who participate actively in fostering lifelong learning in their subordinates. As demonstrated in the present research effort, it is possible to collect such readiness data via phone interviews and surveys, but a "boots-on-the-ground" perspective would be more effective in collecting plentiful and detailed information about how engagement in lifelong learning can be translated into the savings of life, time, and money (particularly in a deployed setting). Such detail would enhance the qualitative causal model of LLC impact and lead to the development of new metrics and measures. Unfortunately, such detail would be costly and time consuming to gather, in part because lifelong learning graduates are widely distributed and difficult to track individually.

## Implications for Using the LLC Assessment Framework

### *Lesson #1 Implications*

The rapid rate of change discovered in Lesson #1 (Rapid Change) indicates that some modification to the LLC Assessment Framework will be required to conduct LLC self-assessments in the future. The present research suggests that the nature of these modifications will be the addition or modification of logic model component elements, as well as new or modified metrics and measures, provided that new use practices or technologies (not anticipated by the current framework) are assessed. Activities identified in the revised LLC Assessment Framework likely will have to be adjusted somewhat as the LLC concept itself is expanded to regional and enterprise level. For instance, actions on the part of regional and enterprise LLC technical staff to facilitate collaboration (distributed and face-to-face) with course developers, instructors, administrators, and subject matter experts must be a critical target for future LLC assessments.

A second implication of Lesson # 1 is that the cost of automating LLC assessment likely would significantly outweigh the benefit. Oversight would be required to ensure that automated assessment measures use the correct terminology, address the appropriate technologies, apply to the right courses, and so on, which will change often over time. Similarly, administration would be necessary in order to verify the accuracy and quality of data collected automatically in the context of frequent, rapid change. The actions that assessment personnel would have to take to exert the proper control over data flow would amount to functionally the same activities that would be conducted to assess the LLCs without automation.

### *Lesson #2 Implications*

Lesson #2 (Person in the Loop) indicates that LLC self-assessment is far from becoming an automated process. A person is required to (1) determine the minor modifications to the LLC Assessment Framework for particular applications; (2) develop or revise measures (or decide to use the measures as is); (3) conduct data collection, analysis, and interpretation; and (4) communicate results to others. To perform these functions, this person (or people) must have a working knowledge of adult learning theory and practice, instructional design, educational technology, research design, and elementary statistics.

Automating the assessment process, at least in the early stages of the lifelong learning initiative, not only would not be feasible given the rapid rate of change, the nascent state of metrics and measures, and widely distributed sources of assessment data, but also would lack the diagnostic detail necessary to understand the basis of shortfalls and stimulate growth. For this reason alone, rapid advancement toward automation at this time should not be encouraged. Rather, the time and effort required to design automated data collection should be invested in developing the relationships and research methods necessary to integrate the diverse sources of information about LLC effectiveness and impact. Automation then could be used to facilitate an existing process rather than to determine that process.

*Lesson #3 Implications*

The key implication of Lesson #3 (Face Time) is that applying the LLC Assessment Framework must involve a significant amount of time devoted to being physically present at the proponent schoolhouse supported by the LLC. Visits to the schoolhouse must involve face-to-face contact with key stakeholders and other providers in which interpersonal exchange fosters trust and mutual understanding. Time spent at the schoolhouse, particularly if the assessor is only a temporary visitor, should leverage the close proximity of stakeholders, using the opportunity to ensure that a large, representative sample of people is contacted.

*Lesson #4 Implications*

It should not be concluded from Lesson #4 (Field Work) that the unit readiness metrics specified in the LLC Assessment Framework cannot be addressed. Rather, the necessary authority, need to know, social connections, and outreach process must be in place to make readiness data collection feasible and cost-effective. The existing connections between field units and LLC staff who provide On-Demand Training could facilitate data collection, and did, in the present research. In addition, LLC staff processes could be tailored to develop a formal method for maintaining such contact. Closer coordination at the program/organizational level between training and personnel managers could facilitate the data sharing necessary to determine LLC impact. Research conducted by institutions closely affiliated with the Army should be explicitly devoted to identifying the necessary means to capture readiness data from the field and the challenges to applying these methods.

## A Proposed LLC Self-Assessment Plan

As alluded to above, a successful LLC self-assessment program should feature the following characteristics:

- A staff of people with working knowledge of (ideally experts in) adult learning theory and practice, educational technology, instructional design, research design, and elementary statistics to design and oversee the assessment process;
- An assessment process that involves significant face time between assessors, stakeholders, and other providers; and
- Sufficient authority and social networks to orchestrate extensive field data collection.

The program also must be resource-efficient, chiefly by leveraging existing resources, capitalizing on previous work, re-using assessment instruments, and using automation, where feasible.

The LLC self-assessment program requires these features in order to (1) maintain knowledge of the rapid, frequent changes to LLC characteristics; (2) determine whether modifications to the LLC Assessment Framework are necessary to conduct assessment; (3) develop, as needed, new metrics and measures; (4) conduct data collections; (5) analyze, interpret, and disseminate findings; and (6) provide actionable recommendations for future LLC

growth. Figure 3 below shows the general layout of a proposed LLC self-assessment plan, which is discussed in more detail below.

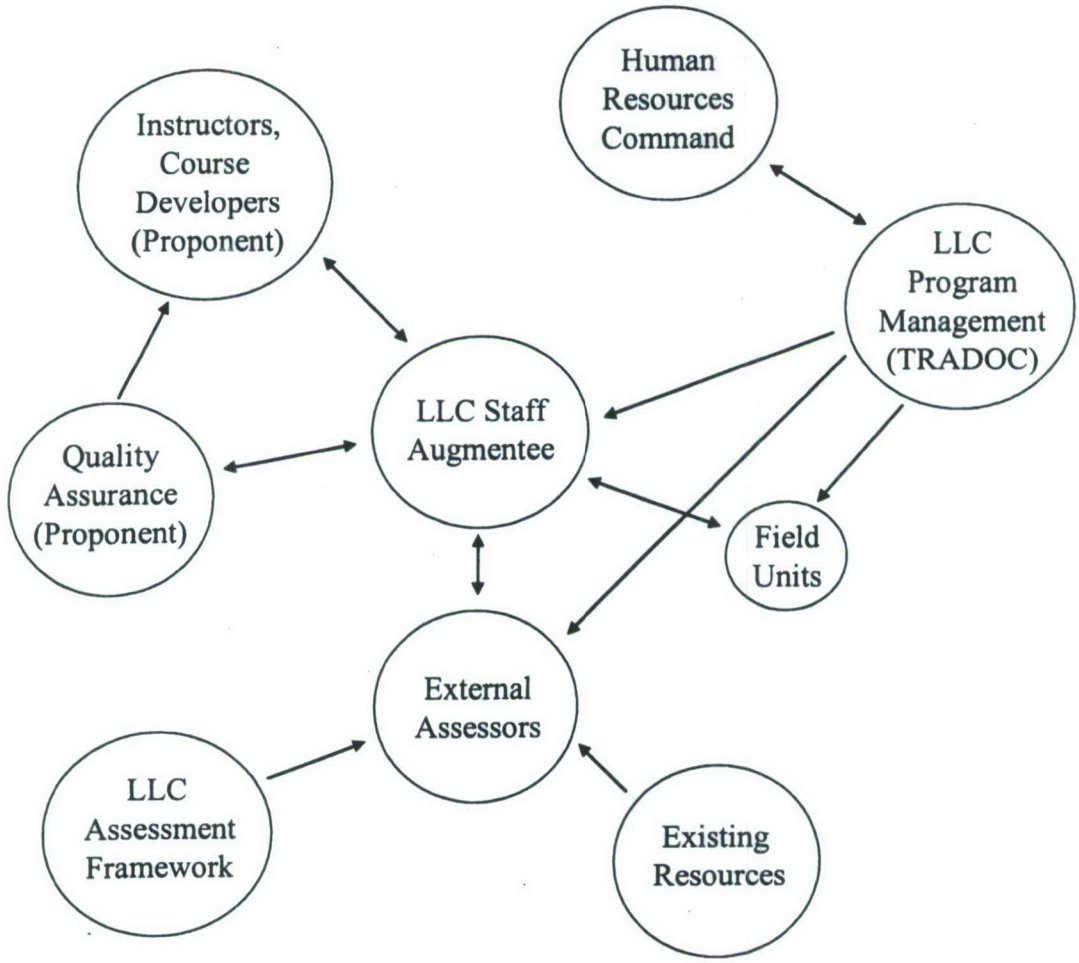


Figure 3. Schematic of the Proposed LLC Assessment Plan

*External Assessors*

The people ultimately responsible for conducting LLC self-assessment should be disinterested parties, independent of the lifelong learning initiative. They should not be employed by an organization whose access to funding or other resources is linked to assessment findings. Assessment personnel also should not be the same people responsible for making decisions about funding or the allocation of other resources to the LLC. Maximizing the independence of assessors in this way reduces the likelihood that biases are consciously or (more likely) unconsciously used to guide the investigative "spotlight" or the interpretation of data.

In the proposed LLC self-assessment plan, external assessors are assessment specialists independent of the proponent and LLC program management who plan assessment, collect data,

analyze findings, and present results. They use the LLC Assessment Framework as a basis for designing their assessment plan, as well as other resources, as necessary. For instance, the Advanced Distributed Learning Co-Laboratory (ADL Co-Lab) provides training and other support materials for educational program evaluation. These materials include a worksheet for planning training evaluation, sample survey questions to capture student and instructor reactions to training, and slides/handouts detailing the training evaluation process. Although the sample survey questions relate to only one aspect of the LLC Assessment Framework, the planning worksheet and evaluation process slides/handout could be used to assist with assessment more broadly. All of these documents may be retrieved from the ADL Co-Lab by creating an account with *adlcommunity.net* and searching the contents of the Research and Evaluation folder.

Another useful resource for assessors is TRADOC's *Pamphlet 350-70-4* (2004) and *Accreditation Standards and Guide* (2007). The pamphlet details the assessment process, including how to plan assessment, collect data, analyze findings, and disseminate results. The evaluation guide for accreditation presents 31 standards for evaluating proponent instruction as well as detailed instructions for applying them. Several of these standards overlap with the LLC Assessment Framework methods. Hays, Stout, and Ryan-Jones (2005) presents assessment checklists to be used when assessing CBT/WBT. Although none of these documents alone is fully applicable to assessing LLCs, these resources, combined with the LLC Assessment Framework and associated reports, should provide sufficient guidance for knowledgeable individuals to conduct a program evaluation consistent with the Army's expectations.

External assessors may come from within the government or outside of it. One option for external assessment provided by the government is the ADL Co-Lab. The ADL Co-Lab assists in evaluating the efficiency and effectiveness of other initiatives that fall under the general lifelong learning rubric, including the U.S. Joint Forces Command individual augmentee training program and the Defense Ammunition Center's internship training program, among others. Another external assessor within the government could be the TRADOC Analysis Center. Assessors from outside the government may come from the plethora of contractors who specialize in instructional design and educational program evaluation.

External assessors should be capable of recognizing the larger social context in which assessment takes place. People with this ability are better able to understand (1) the concerns that stakeholders and other providers will have about being assessed; (2) the methods for building trust and exchange; (3) the organizational context that places external constraints on LLC impact; and (4) the importance of framing results in a way that is true to the findings but satisfactory to the stakeholders involved. Sensitivity to the larger social context prepares assessors to apply their assessment-related expertise in a way that will produce the most meaningful findings, accepted results, and actionable recommendations. Understanding the larger context would be greatly enhanced by an effective LLC Staff Augmentee, whose role is described below.

*LLC Staff Augmentee*

The proposed LLC Staff Augmentee plays the critical role in LLC assessment by facilitating the connection between external assessors, LLC program management, proponent

stakeholders, external data sources (e.g., personnel databases), and external stakeholders (i.e., field units). Like the external assessor, this person has expertise in the areas of adult learning theory, technology-assisted instruction, and educational program evaluation. The LLC Staff Augmentee is situated with the proponent, but is a government employee of the larger LLC program. This person therefore would have the expertise and access necessary to serve as a multi-party liaison who is capable of coordinating closely with the LLC technical staff, schoolhouse faculty and course developers, subject matter experts, proponent quality assurance personnel, and field unit trainers. This person would be able to reach back to the program level of LLC management to facilitate access to external database information and field unit leadership, which will enable data collection that is external to the proponent schoolhouse. As an employee at the program level, the LLC Staff Augmentee also would be responsible for ensuring that the assessment and evolution of a particular LLC feeds the larger process, including the production of generalizable assessment methods and the development of a shared knowledge base of LLC program effectiveness.

The knowledge and close coordination of the LLC Staff Augmentee would facilitate data collection by assisting external assessors in identifying stakeholders (inside and outside of the schoolhouse), procuring archival data, and achieving access to schoolhouse courses, field unit trainers, and personnel and training bases. The LLC Staff Augmentee also would provide external assessors with the current technical status of the LLC, as well as the history of changes, the larger organizational context, and related documentation. The implementation of assessors' recommendations would be enabled by the LLC Staff Augmentee's collaboration with proponent quality assurance personnel responsible for faculty development. The LLC Staff Augmentee would contribute his or her expertise in technology-assisted instruction to designing and delivering faculty development at the request of quality assurance.

*Quality Assurance (Proponent)*

The expertise of proponent quality assurance personnel should be leveraged to assist with data collection both internal and external to the schoolhouse. These individuals have significant experience with conducting assessment of Army training initiatives and have ready access to existing resources that could support the LLC evaluation effort. Ongoing quality assurance studies should be brought to the attention of external assessors by the LLC Staff Augmentee so that efforts are not duplicated and time is saved by re-using assessment processes. Moreover, the LLC Staff Augmentee should identify recurring LLC assessment targets and work with quality assurance to include these as part of their investigation of proponent effectiveness. Additional contracted personnel may be required to assume added quality assurance duties, but quality assurance leaders have experience recruiting, selecting, and training educational assessors and may be considered more independent than members of an LLC staff who might be considered as alternatives.

*LLC Program Management (TRADOC)*

The role of LLC program management in the proposed assessment plan is to ensure that lifelong learning assessment and development are tightly coupled through coordinated processes across the LLCs. These processes should not necessarily be standardized, given the unique needs

of each LLC, but they should avoid duplication of effort, collectively paint the "big picture" of the success of lifelong learning, and ultimately facilitate the connection between the lifelong learning initiative, the proponent schoolhouses, and the field Army. The LLC program management would accomplish such synchronized diversity by maintaining reporting authority over the LLC Staff Augmentees but situating them with the proponents. Augmentees would be able to develop the critical relationships necessary to enable lifelong learning but also would have the obligation to coordinate with the augmentees of other LLC staffs and report to the LLC program management about the success of the larger lifelong learning effort. In addition, the organization-level connections of the LLC program management with the Human Resources Command and the key leadership of field units would facilitate the augmentee reach back for the collection of data external to the proponent schoolhouse.

*Reconsidering the Purpose of the LLC Staff*

A critical characteristic of the proposed LLC self-assessment plan is that it involves a slight, but important modification to the envisioned purpose of the LLC staff. The proposed plan is predicated on the assumption that the success of lifelong learning is as much a function of social networks as it is of technical outputs and that the LLC staff could be uniquely situated to provide both. Currently, the role of the LLC staff is considered to be largely technical, involving the construction and maintenance of the LLC portals and the provision of technical support. In contrast, responsibility is somewhat more diffuse and less well articulated for ensuring (1) that relationships are developed with proponent stakeholders to rapidly produce effective training on demand and to conduct meaningful assessment; (2) that proponent faculty and course developers understand how to leverage technology for assisting adult learners; (3) that LLC functionality fits into the larger context of not only the proponent's objectives, but those of organizational Army; and (4) that a body of knowledge is developed to track and facilitate the growth of the lifelong learning concept. Carrying out this responsibility requires the cooperation and coordination of a diverse set of organizations that may or may not be aware (or supportive) of their role in enabling lifelong learning. A central source of strong leadership that understands the needs of the proponent, the LLC program management, and the larger context is needed to maximize impact.

LLC technical staffs as currently constructed do not have the personnel, expertise, or authority to take on these challenging and complex roles. Yet, as the findings of the LLC assessment research program suggest to date, these roles are essential to ensuring the success of lifelong learning by strengthening the link between technical outputs, external factors, and impact. The addition of the LLC Staff Augmentee in the proposed assessment plan is not simply a recommended method for conducting LCC assessment, but also represents an important first step in acknowledging and enacting a more proactive role of LLC program management in equipping LLC staffs to achieve the larger goals of lifelong learning.

## CONCLUSIONS

The present research explored the generalizability of a framework for assessing the effectiveness and impact of LLCs, the concrete instantiation of the U.S. Army's lifelong learning concept. The analysis presented in this report involved a substantial increase in the types of instruction and learning audiences supported by lifelong learning than has been conducted

previously, producing a more representative sample on which to base the framework's design. It was determined that some modification was necessary to the assessment framework to address the variety of possible functions an LLC could provide, but that the logic modeling approach remained a valid method for conducting qualitative causal analysis.

A secondary purpose of the present research was to conduct an assessment of the Fort Gordon LLC. The results of this assessment indicated that although the expected outputs for this LLC generally were delivered, external factors moderated the link between outputs and outcomes at all levels (individual, unit, and organizational). That is, in the absence of controlled experimental study, inferences could be made regarding the determinants of program strengths and weaknesses by using a qualitative causal model. Shaping the influence of external factors required closer coordination among the LLC staff and proponent offices as well as closer coordination among decision makers at the organizational and Army level.

A third purpose of this research effort was to specify an assessment plan that would enable LLCs to adopt the revised LLC Assessment Framework to conduct self-assessment. The design of this plan was based on lessons learned in the present investigation as well as previous ARI LLC assessment research (Cianciolo, 2007). A key feature of this plan is the emphasis placed on reconsidering the role of LLC staffs such that they serve a critical social as well as technical function. The self-assessment plan addressed the need to more closely coordinate efforts by situating program-level assessment personnel at the proponent. Staffing in this way would facilitate the social connections necessary to conduct assessment internally and externally and would ensure that assessment findings were actively used to enhance the larger lifelong learning initiative.

## Limitations of the Present Research

The limitations of the present research involve the lack of empirical basis of the Fort Gordon LLC assessment. First, emphasis on exploring methods to substitute for surveys, combined with the short duration of this research effort, reduced the representativeness of the sample used in some cases (e.g., only three SCCC classes were observed, only three 25B10 instructors were interviewed). In these instances, converging evidence was used to support lack of data, but further study is warranted. Where representative sampling was possible (e.g., as in discussion forum analysis), it was conducted. Moreover, in several instances, the relatively small sample actually was the population (e.g., 25B10 was the only MOSQ course delivered both in the schoolhouse and to non-resident students).

Second, where comparisons across conditions were of interest (e.g., training effectiveness with and without simulations), lack of authority to manipulate treatment conditions prevented controlled experimental study. Where possible, archival data and/or quasi-experimental designs (e.g., as in the SCCC) were used--and the qualitative causal model provided a great deal of converging evidence--but systematic study would provide a stronger basis for conclusions.

An additional, important limitation of the present research was the lack of external data that could provide information about the impact of lifelong learning on unit readiness. AUTOGEN surveys, as well as surveys created as part of this research effort, suffered from

insufficient response rates. Phone interviews with unit trainers who established Unit Universities were helpful, but failed to provide detailed accounts of the impact of lifelong learning. The enthusiasm of unit trainers for LLCs was great, but direct contact with and observation of these trainers' units is necessary to understand the concrete reality of how training on demand has changed the readiness posture of units in the field.

## Recommendations for Future Research and Practice

Future research should focus on identifying and applying the means necessary to conduct external data collection. Visits to line units actively using lifelong learning should be paid in order to observe directly the impact that anytime, anywhere instruction has on performance. Face time with these units also would enable the collection of comprehensive interviews and focus groups to gather detailed information for developing additional outcome metrics. Such investigation would reveal, for example, the acceptable amount of lag between the request for and delivery of On-Demand Training. Physical presence with the units also would reveal additional external factors that influence the adoption of lifelong learning and potential methods for addressing these factors and expanding LLC marketing outreach. The schoolhouse environment and, to some extent, the distance learning setting is fairly well understood, but the operational learning environment remains largely unexplored.

Future research also should explore and identify the additional modes of instruction and learning audiences that are being or will be addressed by current and envisioned LLCs. Although a wide sampling of educational opportunities was featured in this report and in Cianciolo (2007), there is sufficient reason to believe that this sample was not comprehensive. This research could be conducted by reviewing each LLC's planning documentation and conducting site visits to each proponent to interview key stakeholders.

Future practice must ensure that the critical, proactive social role of the LLC staff be acknowledged and actively developed. Initiating self-assessment as envisioned in this report would represent a significant step in this direction. Future research supporting this effort should explore the particular social networks and processes necessary to enable effective LLC functioning at the regional and enterprise level, as well as at the proponent level. Changes to technical support structures must retain the critical coordinative and collaborative roles served by a fully functional LLC staff.

## Closing Thoughts

In summary, the present investigation attempted to achieve three goals: (1) to examine the generalizability of the LLC Assessment Framework put forth in previous ARI research; (2) to apply the revised framework to assessing the Fort Gordon LLC; and (3) to explore the requirements for enabling LLC's to conduct their own assessment in the future. The findings of this research were that the assessment framework was generalizable, but required modification in order to address the broad range of training and education strategies supported by the Fort Gordon LLC. It is expected that this variety of strategies represents the majority of learning approaches that will be taken by other current and future LLCs, but some modification to the framework will be necessary for each assessment that is conducted. The Fort Gordon LLC was

found generally to be accomplishing its output goals but that external factors sometimes moderated the link between outputs and expected outcomes. Recommendations for enhancing outcomes and for conducting future LLC assessment emphasized the importance of coordination among the LLC technical staff, proponent stakeholders, the LLC program management, and other stakeholders at the Army level. LLCs represent the future of adaptive training and education, and it is hoped that these findings will foster continued growth and the broad impact envisioned for the lifelong learning initiative.

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# APPENDIX A – ACRONYMS

| | |
|---|---|
| ADL Co-Lab | Advanced Distributed Learning Co-Laboratory |
| ANCOC | Advanced Non-Commissioned Officer Course |
| AOT | assignment-oriented training |
| ARI | U.S. Army Research Institute for the Behavioral and Social Sciences |
| ATRRS | Army Training Requirements and Resources System |
| AUTOGEN | automatic survey generation |
| BCKS | Battle Command Knowledge System |
| BNCOC | Basic Non-Commissioned Officer Course |
| BOLC | Basic Officer Leadership Course |
| CBT | computer-based training |
| DL | distance learning |
| HTRC | high-tech regional center |
| JNN | joint network node |
| LLC | lifelong learning center |
| LTC | lieutenant colonel |
| MANSCEN | Maneuver Support Center |
| MOS | military operating specialty |
| MOSQ | military operating specialty qualified |
| MTT | mobile training team |
| NCO | non-commissioned officer |
| SCCC | Signal Captains Career Course |
| SOP | standard operating procedure |
| TRADOC | U.S. Army Training and Doctrine Command |
| UIT | University of Information Technology |
| WBT | web-based training |

# APPENDIX B – REVISED LLC ASSESSMENT FRAMEWORK

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| **Resources: Money -- Cost per Course (Summed categories equal total cost for all courses) (For cost comparisons, the analogous metrics must be used for the comparison condition.)**<br>**Metrics answer the question: What funding is being allocated where to support courses administered via the LLC?**<br>**So what?: Tracking where the money is going is necessary to link course expenditures to course outcomes and to build cost-effectiveness measures. Such tracking enables decision makers to allocate future funding based on the anticipated effect on system activity, output, and outcomes.** | | | | | | |
| Estimated costs attributable to a particular course -- Instructor | $ (in K) spent annually on instructor time to teach the course of interest | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Survey or interview + archival data - Estimate the % of each instructor's annual time (based on relative number of students taught) spent on preparing, administering, and teaching the course of interest, then calculate this percentage of each instructor's annual salary; Sum across relevant instructors | X | X | X |
| Estimated costs attributable to a particular course -- Technical staff | $ (in K) spent annually on technical staff time to support student, instructors, and course developers during the course of interest, including posting and maintenance of course content and faculty development activities | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Survey or interview + archival data - Estimate the % of each tech staff member's annual time spent enrolling, monitoring, and supporting the course of interest (based on relative number of students/instructors in each course and other staff activities), then calculate this percentage of each tech staff member's annual salary; Sum across tech staff members | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Estimated costs attributable to a particular course -- course developers | $ (in K) spent annually on curriculum developer time to develop curriculum materials for the course of interest | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Survey or interview + archival data - Estimate the % of each curriculum developer's annual time spent writing materials for the course of interest (based on the relative amount of new content), then calculate this percentage of each curriculum developer's annual salary; Sum across course developers | X | X | X |
| Estimated costs attributable to a particular course -- Students | $ (in K) spent annually on student travel, pay, and lodging costs to attend instruction | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Survey or interview + archival data - Estimate the average per student cost for travel, pay, and lodging, then multiply by the number of students enrolled in the course (include recycled student costs, where applicable) | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Estimated costs attributable to a particular course -- CBT/WBT Courseware Production Team (instructional designers/analysts, programmers, and media specialists) | $ (in K) spent annually on courseware production team member time to produce (including validation) or oversee the production of CBT/WBT courseware for the course of interest | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Survey or interview + archival data - Estimate the % (based on relative number of lessons) of the CBT/WBT courseware production team's annual time spent producing (including validation) or overseeing the development of courseware for the course of interest, then calculate this percentage of the total team salary | | X | |
| Estimated costs indirectly attributable to a particular course -- Leadership & Administrative | $ (in K) spent on leadership and administrative time to oversee and grow a particular course | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Survey or interview + archival data - Divide the total leadership and administrative salary by the number of courses, weighted by course months | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Estimated information technology costs indirectly attributable to a particular course | $ (in K) spent on hardware and software used by the course of interest | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Survey or interview + archival data - Calculate annual use charge for hardware and software (including simulations), using proportion of direct costs as an allocation base; a multiplication factor of .33 assumes software has a useful life of 3 years; a multiplication factor of .20 assumes hardware has a useful life of 5 years | X | X | X |
| Supplies costs indirectly attributable to a particular course (includes range equipment and supplies, such as ammunition and fuel) | $ (in K) spent annually on supplies used by the course of interest | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Survey or interview + archival data - Divide total supplies cost by the number of courses, weighted by enrollment (breakdown by supply type, e.g., range supplies, printing and reproduction, etc., may be necessary, in which case the metric represents the sum of weighted cost proportions across the applicable categories) | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Supplies costs directly attributable to a particular course (e.g., printing and reproduction, includes range equipment and supplies) | $ (in K) spent annually on supplies used only for the course of interest | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Archival data - Actual or contracted costs | X | X | X |
| Facilities costs indirectly attributable to a particular course | $ (in K) spent annually on facilities used by the course of interest (facilities costs include the cost to maintain ranges, classrooms, office space, server rooms, lecture halls, etc.) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Survey or interview + archival data - Compute annual use charge for facilities (including furniture and land development), using assignable square feet as an allocation base; a multiplication factor of .02 assumes facilities have a useful life of 50 years | X | X | X |
| **Resources: Money -- Annual cost for On-Demand Training**<br>**Metrics answer the question: What funding is being allocated where to support LLC-delivered On-Demand Training?**<br>**So what?: Tracking where the money is going is necessary to understand the cost of On-Demand Training by itself or relative to alternatives (i.e., for cost-effectiveness measures). Such tracking enables decision makers to determine where to cut costs or allocate additional funding.** | | | | | | |
| Estimated costs attributable to On-Demand Training -- Instructor | $ (in K) spent annually on instructor time to deliver courses on demand | Mobile training teams (traditional and LLC-assisted), Virtual mobile training teams | Survey or interview + archival data - Estimate the % of each instructor's annual time spent on preparing, administering, and teaching courses on demand, then calculate this percentage of each instructor's annual salary; Sum across relevant instructors | | | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Estimated costs attributable to On-Demand Training -- Technical staff | $ (in K) spent annually on technical staff time to support students, instructors, course developers, unit trainers, and other users of On-Demand Training | Mobile training teams (traditional and LLC-assisted), Virtual mobile training teams, Simulation downloads | Survey or interview + archival data - Estimate the % of each tech staff member's annual time spent developing, maintaining, and supporting On-Demand Training, then calculate this percentage of each tech staff member's annual salary; Sum across tech staff members | | | X |
| Estimated costs attributable to On-Demand Training -- course developers | $ (in K) spent annually on curriculum developer time to create course content for courses on demand | Mobile training teams (traditional and LLC-assisted), Virtual mobile training teams | Survey or interview + archival data - Estimate the % of each curriculum developer's annual time spent developing modified or unique content for on-demand training, then calculate this percentage of each curriculum developer's annual salary; Sum across course developers | | | X |
| Estimated costs attributable to On-Demand Training -- Students | $ (in K) spent annually on student travel, pay, and lodging costs to attend instruction | Mobile training teams (traditional) | Survey or interview + archival data - Estimate the average per student cost for travel, pay, and lodging, then multiply by the number of students enrolled in the course | | | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Estimated information technology costs indirectly attributable to On-Demand Training | $ (in K) spent annually on hardware and software used for On-Demand Training | Mobile training teams (traditional and LLC-assisted), Virtual mobile training teams, Simulation downloads | Survey or interview + archival data - Calculate annual use charge for hardware and software (including simulations), using proportion of direct costs as an allocation base; a multiplication factor of .33 assumes software has a useful life of 3 years; a multiplication factor of .20 assumes hardware has a useful life of 5 years | | | X |
| Supplies costs indirectly attributable to On-Demand Training (includes range equipment and supplies, such as ammunition and fuel) | $ (in K) spent annually on supplies used for developing, maintaining, and delivering On-Demand Training | Mobile training teams (traditional and LLC-assisted), Virtual mobile training teams, Simulation downloads | Survey or interview + archival data - Divide total supplies cost by the number of on-demand courses, weighted by enrollment (breakdown by supply type, e.g., range supplies, printing and reproduction, etc., may be necessary, in which case the metric represents the sum of weighted cost proportions across the applicable categories) | | | X |
| Supplies costs directly attributable to On-Demand Training (e.g., printing and reproduction, includes range equipment and supplies) | $ (in K) spent annually on supplies used only for developing, maintaining, and delivering On-Demand Training | Mobile training teams (traditional and LLC-assisted), Virtual mobile training teams, Simulation downloads | Archival data - Actual or contracted costs | | | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Facilities costs indirectly attributable to On-Demand Training | $ (in K) spent annually on facilities used to deliver On-Demand Training (facilities costs include the cost to maintain ranges, classrooms, office space, server rooms, lecture halls, etc.) | Mobile training teams (traditional and LLC-assisted), Virtual mobile training teams, Simulation downloads | Survey or interview + archival data - Compute annual use charge for facilities (including furniture and land development), using assignable square feet as an allocation base; a multiplication factor of .02 assumes facilities have a useful life of 50 years | | | X |
| **Resources: Money -- Annual cost for Discussion Forums**<br>**Metrics answer the question: What funding is being allocated where to support the implementation of discussion forums?**<br>**So what?: Tracking where the money is going is necessary to understand the cost of discussion forums alone or relative to alternatives (i.e., for cost-effectiveness measures). Such tracking enables decision makers to determine where to cut costs or allocate additional funding.** | | | | | | |
| Estimated costs attributable to discussion forums -- Technical staff | $ (in K) spent annually on technical staff time to support discussion forum users (includes BCKS augmentees) | Discussion forums hosted in the LLC (vice elsewhere, e.g., BCKS) | Survey or interview + archival data - Estimate the % of each tech staff member's annual time spent maintaining, facilitating, and administering discussion forums, then calculate this percentage of each tech staff member's annual salary; Sum across tech staff members | | | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Estimated information technology costs indirectly attributable to discussion forums | $ (in K) spent annually on hardware and software used for discussion forums | Discussion forums hosted in the LLC (vice elsewhere, e.g., BCKS) | Survey or interview + archival data - Calculate annual use charge for hardware and software, using proportion of direct costs as an allocation base; a multiplication factor of .33 assumes software has a useful life of 3 years; a multiplication factor of .20 assumes hardware has a useful life of 5 years | | | X |
| Supplies costs indirectly attributable to discussion forums | $ (in K) spent annually on supplies used for maintaining, facilitating, and administering discussion forums | Discussion forums hosted in the LLC (vice elsewhere, e.g., BCKS) | Survey or interview + archival data - Divide total supplies cost by the number of on-demand courses, weighted by enrollment (breakdown by supply type, e.g., range supplies, printing and reproduction, etc., may be necessary, in which case the metric represents the sum of weighted cost proportions across the applicable categories) | | | X |
| Supplies costs directly attributable to discussion forums (e.g., printing and reproduction) | $ (in K) spent annually on supplies used only for maintaining, facilitating and administering discussion forums | Discussion forums hosted in the LLC (vice elsewhere, e.g., BCKS) | Archival data - Actual or contracted costs | | | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Facilities costs indirectly attributable to discussion forums | $ (in K) spent annually on facilities used to implement discussion forums (facilities costs include office space, server rooms, etc.) | Discussion forums hosted in the LLC (vice elsewhere, e.g., BCKS) | Survey or interview + archival data - Compute annual use charge for facilities (including furniture and land development), using assignable square feet as an allocation base; a multiplication factor of .02 assumes facilities have a useful life of 50 years | | | X |
| **Resources: Personnel**<br>**Metrics answer the question: How many people are allocated to which personnel category?**<br>**So what?: Tracking personnel numbers is necessary to link people to aspects of LLC activities and outputs. Such links enable decision makers to determine where to assign additional personnel and the anticipated effect that personnel assignment will have on system activity and output.** | | | | | | |
| Technical staff | # technical staff personnel | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format), On-Demand Training, and Discussion forums | System analysis + Interviews | X | X | X |
| Course developers | # course developers | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format), On-Demand Training, and Discussion forums | System analysis + Interviews | X | X | X |
| CBT/WBT Courseware Production Team | # CBT/WBT courseware production team members (by job type: instructional designers/analysts, programmers, media specialists, etc.) | Leader education, MOSQ instruction (resident and non-resident) | System analysis + Interviews | | X | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Instructors | # instructors | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format), On-Demand Training, and Discussion forums | System analysis + Interviews | X | X | X |
| Leadership & administrative | # leadership and administrative personnel | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format), On-Demand Training, and Discussion forums | System analysis + Interviews | X | X | X |
| **Resources: Technology, equipment, and supplies**<br>**Metrics answer the question: What quantity of technologies, equipment, and supplies is being allocated to the LLC?**<br>**So what?: Tracking resources, especially technology, is necessary to link resources to aspects of LLC activities and outputs. Such links enable decision makers to determine what additional resources to acquire and the anticipated effect that resource procurement will have on system activity and output.** | | | | | | |
| Hardware | (e.g., server machines, personnel equipment and machines) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format), On-Demand Training, and Discussion forums | System analysis + Staff interview | X | X | X |
| Software licenses | (e.g., Breeze, SharePoint, Blackboard) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format), On-Demand Training, and Discussion forums | System analysis + Staff interview | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Facilities | (e.g., housing for server machines and personnel equipment and machines, satellite location facilities, office space, range facilities, etc.) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format), On-Demand Training, and Discussion forums | System analysis + Staff interview | X | X | X |
| Supplies | (e.g., office supplies, range equipment, etc.) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format), On-Demand Training, and Discussion forums | System analysis + Staff interview | X | X | X |
| **Activities: Technical Staff**<br>**Metrics answer the question: Are the technical staff effectively carrying out the activities they are designated to carry out?**<br>**So what?: If the technical staff does not carry out their assigned activities, the LLC will not function effectively and will not be accessible or usable by students, instructors, and course developers.** | | | | | | |
| Provide "train-the-trainer" training on LLC components (including SOPs) | % instructors and course developers trained to technical criterion (i.e., use of LLC applications) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Special purpose measure (knowledge test based on instructional materials) | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Provide "train-the-trainer" training on LLC components (including SOPs) | % instructors and course developers trained to criterion on institutional/ departmental SOPs for content management/ delivery | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Special purpose measure (knowledge test based on SOPs) | X | X | X |
| | Quality of training | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Class observation (using checklist of course quality indicators based on best practice in adult learning) | X | X | X |
| | Perceived utility of/ satisfaction with training | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Trainee survey (items relating to the relevance of the training to addressing key challenge areas) or Focus groups | X | X | X |
| | % repeated technical trouble tickets (i.e., multiple users with same request) that are integrated into technical training updates | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | System analysis – combined examination of help desk data and training content | X | X | X |
| | Participation in/ guidance on SOP development by stakeholders (Y/N) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Trainee survey (items relating to whether these people were involved in an SOP development process with technical staff) or Focus groups | X | X | X |
| | Presence (Y/N) of help documentation for trainee self-development on applications and their use | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | System analysis | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Provide "train-the-trainer" training on LLC components (including SOPs) | Accessibility, usability, and utility of help documentation for trainee self-development | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Trainee survey (instructors and course developers) or Focus groups | X | X | X |
| Provide support for answering Field Army users' operational questions | % user operational questions (phone, email, other) addressed (requester acknowledged, answer attempted, appropriate routing initiated) within ¼ hour of posting | Discussion forums, On-Demand Training, Simulation downloads | System analysis – help desk data | X | X | X |
| | % user operational questions requiring re-routing (beyond schoolhouse) that are re-routed within ¼ hour of notice | Discussion forums, On-Demand Training, Simulation downloads | System analysis – help desk data | X | X | X |
| | Perceived accessibility /responsiveness of operational technical support | Discussion forums, On-Demand Training, Simulation downloads | User survey + coordination with technical staff (to locate operational users) | X | X | X |
| | Average time interval between special requests for training and delivery of training | On-Demand Training | Archival data analysis | | | X |
| | Number of topics taught outside of the formal educational setting relative to pre-LLC conditions | On-Demand Training, Simulation Downloads | System analysis + Technical staff interviews | | | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Provide support for answering Field Army users' operational questions | Perceived utility of operational technical support | Discussion forums, On-Demand Training, Simulation downloads | User survey + coordination with technical staff (to locate operational users who have requested technical support) | X | X | X |
| | % repeated operational questions that are integrated into help desk FAQ updates or other forums | Discussion forums, On-Demand Training, Simulation downloads | System analysis (help desk data and website analysis) + Technical staff survey | X | X | X |
| Provide technical support to students, instructors, and course developers | % technical trouble tickets (phone and walk-in) closed within ¼ hour of posting | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | System analysis – help desk data | X | X | X |
| | % technical trouble tickets (email) closed within ½ hour of posting | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | System analysis – help desk data | X | X | X |
| | Perceived accessibility/ responsiveness of technical support | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | User survey (multiple items) or Focus groups | X | X | X |
| | Perceived utility of technical support | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | User survey (multiple items) or Focus groups | X | X | X |
| | % repeated technical trouble tickets (i.e., multiple users with same request) that are integrated into help desk FAQ updates | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | System analysis – help desk data and website analysis | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Perform technology setup, integration, customization, and management of LLC components | % repeated technical trouble tickets (i.e., multiple users with same request) that are integrated into application customization updates | All | System analysis and Technical staff interviews | X | X | X |
| | % technical problem tickets that resulted from ineffective technology management (e.g., account problems, template bugs, etc.) | All | System analysis and Technical staff interviews | X | X | X |
| | Perceived responsiveness and competency of technical staff to customization requests | All | User survey (multiple indicators to include management of user accounts, creation of initial sites and templates, archive management, etc.) | X | X | X |
| Migrate course content across LLC components (e.g., from SharePoint to Bb) | % content migrated across applications within 24 hours | Leader education | System analysis + Technical staff survey or Focus groups | X | | |
| | Perceived speed of the content migration process | Leader education | Instructor survey (1 or 2 items capturing whether content is available in Bb when needed) or Focus groups | X | | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| **Activities: Course developers (Block Authors, SMEs, and Instructors)**<br>**Metrics answer the question: Are the course developers carrying out the tasks they are designated to carry out?**<br>**So what?: If course developers do not carry out the tasks they are assigned to do, course content will not be up-to-date and relevant and will not the product of multiple expert perspectives on the topic to be learned. In addition, the adequacy of course content will be subject to individual differences, rather than the result of a finely tuned collaborative process.** | | | | | | |
| Collaboratively generate course content using LLC applications | % course developers using the designated LLC component to store, share, and revise course content materials | Leader education | System analysis + Developer survey (multiple items, 1 for each task) or Focus groups | X | | |
| | % course developers who report being able to use the designated LLC component for document sharing outside of the schoolhouse setting | Leader education | Developer survey (single item) or Focus groups | X | | |
| | % course developers who report using means to collaborate other than/in addition to the designated LLC component (e.g., email, thumb drives, etc.) | Leader education | Developer survey (single item) or Focus groups | X | | |
| | % course developers who actively work together to revise/ improve course materials | Leader education | Developer survey (single item) or Focus groups | X | | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Collaboratively generate course content using LLC applications | Perceived ease of using the designated LLC component to share documents and other materials used in generating course content | Leader education | Developer survey (single item) or Focus groups | X | | |
| (Early adopters) Lead the development of SOPs for leveraging the capabilities of LLC components (e.g., content management systems) | Presence of formal SOPs for leveraging the capabilities of the software applications, including content organization (Y/N) | Leader education | System analysis + Developer survey + Tech staff survey or Focus groups | X | | |
| | Presence of informal SOPs for leveraging the capabilities of the software applications, including content organization (Y/N) | Leader education | System analysis + Developer survey or Focus groups | X | | |
| | If yes, % of early adopters involved in SOP development (as opposed to SOPs being constructed top-down) | Leader education | Developer survey (single item) of Focus groups | X | | |
| (Early adopters) Mentor late adopters on system functionalities to enhance course development | Presence of a formal mentorship system for assisting late adopters leverage software capabilities (Y/N) | Leader education | Developer survey + Interviews or Focus groups | X | | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| (Early adopters) Mentor late adopters on system functionalities to enhance course development | Presence of an informal mentorship system for assisting late adopters leverage software capabilities (Y/N) | Leader education | Developer survey + Interviews or Focus groups | X | | |
| | % late adopters who report asking early adopters for best practices | Leader education | Developer survey (single item) or Focus groups | X | | |
| | % early adopters who report offering advice to late adopters | Leader education | Developer survey (single item) or Focus groups | X | | |
| **Activities: Instructors (includes Division Chiefs, Department Heads, and related course administrators)**<br>**Metrics answer the question: Are the instructors carrying out the tasked they are designated to carry out?**<br>**So what?: If instructors do not carry out their assigned tasks, course content will not be made available to students in a way that enables them anytime/anywhere access. In addition, the LLC technologies will not be leveraged to make more effective use of class time and instructional strategies (i.e., greater focus on learning the content and achieving higher levels of cognitive processing).** | | | | | | |
| Deliver course content via posting in the LLC | % instructors who use means other than Bb to deliver course content | Leader education, MOSQ instruction (resident and non-resident) | Instructor survey (single item) or Focus groups | X | X | X |
| Customize course content based on student feedback and access to Army KM and other resources | % instructors who use BCKS Warrior Knowledge Base or Leader Network to post supplemental course content in Bb | Leader education | Instructor survey (single item) or Focus groups (together w/ the 2 following items, this metric also can be used to examine the relative importance of these resources) | X | | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Customize course content based on student feedback and access to Army KM and other resources | % instructors who use other Army KM resources (e.g., AKO, CALL) to post supplemental course content into Bb | Leader education | Instructor survey (single item) or Focus groups (together w/ the immediately preceding and following items, this metric also can be used to examine the relative importance of these resources) | X | | |
| | % instructors who use non-Army resources to post supplemental course content into Bb | Leader education | Instructor survey (single item) or Focus groups (together w/ the 2 previous items, this metric also can be used to examine the relative importance of these resources) | X | | |
| | Perceived ease of augmenting course content within the LLC framework | Leader education | Instructor survey (single item) or Focus groups | X | | |
| | Perceived utility of providing feedback to instructor on course content | Leader education | Student survey (single item) or Focus groups + System analysis | X | | |
| | % students who gave materials to the instructor to post in Bb | Leader education | Student survey (single item) or Focus groups + System analysis | X | | |
| Perform course administrative duties | % instructors who use Bb to communicate expectations to students | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | System analysis + Instructor survey or Focus groups | X | X | X |
| | % instructors who use Bb to provide "read ahead" notes for each class (different from curriculum read aheads) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | System analysis + Instructor survey or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Evaluate student progress and report grades to school administrators | % instructors who use Bb to administer course exams | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | System analysis + Instructor survey or Focus groups | X | X | X |
| | % instructors who leverage Bb exam functions to provide immediate feedback and remedial instruction | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | System analysis + Instructor survey or Focus groups | X | X | X |
| | % instructors using Bb to report student grades to administrators | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | System analysis + Instructor survey or Focus groups | X | X | X |
| (Early adopters) Lead the development of SOPs for leveraging the capabilities of system components (e.g., collaborative capabilities in Bb) | Presence of formal SOPs for leveraging the capabilities of the software applications for course administration and facilitation (Y/N) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Instructor survey + Tech staff survey (single item) or Focus groups | X | X | X |
| | Presence of informal SOPs for leveraging the capabilities of the software applications for course administration and facilitation (Y/N) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Instructor survey (single item) or Focus groups | X | X | X |
| | % of early adopters involved in SOP development | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Instructor survey (single item) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| (Early adopters) Mentor late adopters on system functionalities to enhance course instruction | Presence of a formal mentorship system for assisting late adopters leverage software capabilities (Y/N) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Instructor survey (single item) or Focus groups | X | X | X |
| | Presence of an informal mentorship system for assisting late adopters leverage software capabilities (Y/N) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Instructor survey (single item) or Focus groups | X | X | X |
| | % late adopters who report asking early adopters for best practices | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Instructor survey (single item) or Focus groups | X | X | X |
| | % early adopters who report offering advice to late adopters | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Instructor survey (single item) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| **Activities: CBT/WBT Courseware Production Team**<br>**Metrics answer the question: Is the CBT/WBT courseware production team carrying out the tasks they are designated to carry out?**<br>**So what?: If the courseware production team does not carry out its assigned tasks, there will be greater individual differences in the quality of CBT/WBT due to individual differences in instructional design savvy and development capability. In addition, there will be lower average course quality and possibly lower rates of adoption of the LLCs due to unfamiliarity with learning technologies. The LLC must make available quality CBT/WBT to achieve learning effectiveness.** | | | | | | |
| Maintain project teams (instructional designers/analysts, programmers, media specialists) to perform CBT/WBT analysis, design, development, implementation, maintenance, and validation for DL | % proponent CBT/WBT modules analyzed, developed, implemented, and maintained by the courseware production team | Leader education, MOSQ instruction (resident and non-resident) | Archival data + Coordination with courseware production team | | X | |
| | % CBT/WBT modules that have been evaluated and validated by LLC courseware production team | Leader education, MOSQ instruction (resident and non-resident) | Archival data (review of validation reports) + Coordination with courseware production team | | X | |
| | Cohesion/coordination of project teams in conducting CBT/WBT analysis, design, development, implementation, maintenance, and validation | Leader education, MOSQ instruction (resident and non-resident) | Courseware production team survey + Special purpose measure (observer checklist for reviewing team processes and organizational climate) | | X | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Maintain project teams (instructional designers/analysts, programmers, media specialists) to perform CBT/WBT analysis, design, development, implementation, maintenance, and validation for DL | Perceived utility of project teams in CBT/WBT courseware production, maintenance, and validation | Leader education, MOSQ instruction (resident and non-resident) | Personnel survey (instructors, course developers, SMEs, and POI managers, where applicable, to include matters of timeliness, efficiency, feasibility, etc.) or Focus groups + Leader interview | | X | |
| Provide contractual, technical, and educational/quality oversight of contractor-developed CBT/WBT | % proponent CBT/WBT modules developed by outside contractors on which 1 or more members of the courseware production team served as consultants/provided oversight (educational and technical) | Leader education, MOSQ instruction (resident and non-resident) | Archival data + Coordination with courseware production team | | X | |
| | Perceived utility/effectiveness of consultation/oversight (educational and technical) | Leader education, MOSQ instruction (resident and non-resident) | Contractor survey (multiple items to include matters of timeliness, quality, relevance, etc.) or Focus groups | | X | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Provide contractual, technical, and educational/quality oversight of contractor-developed CBT/WBT | Ratio of time spent between courseware submission to ATSC and acceptance (SCORM conformance and TRADOC 350-70 Regulation conformance) for LLC-overseen CBT/WBT versus non-overseen CBT/WBT (value < 1 indicates time savings in the submission-acceptance process for LLC-overseen CBT/ WBT) | Leader education, MOSQ instruction (resident and non-resident) | Archival data + Coordination with courseware production team + Coordination with outside contractors | | X | |
| | Perceived quality of contract oversight | Leader education, MOSQ instruction (resident and non-resident) | Contractor survey (multiple items to include matters of timeliness, clarity of communication, alignment of expectations, etc.) or Focus groups + Leadership survey (items pertaining to complaints, disputes, lags in contracting) | | X | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Maintain a database of CBT/WBT technologies, capabilities, and techniques | Presence (Y/N) of database containing documentation on CBT/WBT technologies, capabilities, and techniques, CBT/WBT lessons learned, scholarly literature on adult education and educational technology, and lifelong learning strategies | Leader education, MOSQ instruction (resident and non-resident) | System analysis (using a checklist for type of materials present, if database exists) | | X | |
| | % of materials in the database that are current (written within the past 2 years; expectation is for a roughly horizontal distribution) | Leader education, MOSQ instruction (resident and non-resident) | System analysis | | X | |
| | % courseware production team members who access database materials (weekly, monthly, prior to new project) | Leader education, MOSQ instruction (resident and non-resident) | Courseware production team survey or Focus groups + System analysis | | X | |
| | % of courseware production team members who regularly (daily, weekly, monthly, etc.) contribute database materials | Leader education, MOSQ instruction (resident and non-resident) | Courseware production team survey or Focus groups + System analysis | | X | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Maintain a database of CBT/WBT technologies, capabilities, and techniques | Frequency of updates to the database (daily, weekly, monthly, etc.) | Leader education, MOSQ instruction (resident and non-resident) | System analysis | | X | |
| | Perceived accessibility/utility of the database | Leader education, MOSQ instruction (resident and non-resident) | Courseware production team survey | | X | |
| **Activities: Leadership**<br>**Metrics answer the question: Is the leadership carrying out the tasks it is designated to carry out?**<br>**So what?: Without effective leadership, the LLC will fail due to lack of organization, purpose, and support.** | | | | | | |
| Conduct user and stakeholder needs assessment | Formal user and stakeholder needs assessment conducted (Y/N) | All | System analysis + Leader interview | X | X | X |
| | Stakeholder perceptions of inclusion in the decision-making process | All | Instructor and developer survey (single item) or Focus groups | X | X | X |
| | Presence (Y/N) in needs assessment of external factors recognized as potential moderators of success | All | Archival data analysis (needs assessment review) | X | X | X |
| | Frequency of leader/stakeholder interactions during LLC planning and implementation | All | Leader interview + instructor and developer survey (single item) or Focus groups | X | X | X |
| Provide vision | Perceived involvement in the design of his/her proponent's LLC (as opposed to design coming from top-down or strictly bottom-up | All | Leader interview | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Provide vision | Presence of a leader-developed plan stating the goals and processes of his/her proponent's LLC | All | System analysis (LLC planning documentation, presence and where located) | X | X | X |
| | Leader ability to concretely state the goals (end state/effects) to be achieved by his/her proponent's LLC | All | Leader interview | X | X | X |
| | Leader ability to concretely state the means (key tasks) by which his/her proponent LLC will attain the stated goals | All | Leader interview | X | X | X |
| | Leader ability to concretely state the external factors that may moderate the effectiveness of his/her LLC in reaching stated goals (and methods for handling them) | All | Leader interview | X | X | X |
| Communicate vision/market LLC concept to stakeholders (including course developers, instructors, courseware developers, technical staff, students, and field Army) | % instructors who understand the "commander's intent" for the LLC | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Instructor survey or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Communicate vision/market LLC concept to stakeholders (including course developers, instructors, courseware developers, technical staff, students, and field Army) | % course developers who understand the "commander's intent" for the LLC | Leader education | Course developer survey or Focus groups | X | | |
| | % technical staff who understand the "commander's intent" for the LLC | All | Technical staff survey or Focus groups | X | X | X |
| | % courseware developers who understand the "commander's intent" for the LLC | Leader education, MOSQ instruction (resident and non-resident) | Courseware developer survey or Focus groups | | X | |
| | % field Army users who understand the "commander's intent" for the LLC | On-Demand Training, Discussion forums | User survey or Focus groups | | | |
| | Presence of shared understanding among stakeholders of the purpose and status of the LLC | All | Special purpose measure (% agreement among survey responses) | X | X | X |
| | % marketing LLC activities conducted | All | Special purpose measure (checklist of marketing activities, to include mass emails, briefings, advertisements, etc.) | X | X | X |
| Procure resources to maintain/update the LLC | Adequacy of funding for LLC | All | Leader interview + Personnel interview or Focus groups | X | X | X |
| | Adequacy of personnel (#s) for LLC | All | Leader interview + Personnel interview or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Procure resources to maintain/update the LLC | Adequacy of technology (machines, up-to-date software versions, etc.) | All | Leader interview + Technical staff interview or Focus groups | X | X | X |
| Oversee operations/Ensure LLC functionality | Perceived leader effectiveness (instructors) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | Instructor survey (multiple indicators reflecting effectiveness in consideration/support of instructor needs, overall system functioning, etc.) or Focus groups | X | X | X |
| | Perceived leader effectiveness (course developers) | Leader education | Course developer survey (multiple indicators reflecting effectiveness in consideration/support of course development needs, overall system functioning, etc.) or Focus groups | X | | |
| | Perceived leader effectiveness (courseware production team) | Leader education, MOSQ instruction (resident and non-resident) | Course production team survey (multiple indicators reflecting effectiveness in consideration/support of instructional technology needs, facilitating coordination among managers and instructors/course developers, etc.) or Focus groups | | X | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Oversee operations/Ensure LLC functionality | Perceived leader effectiveness (technical staff) | All | Technical staff survey (multiple indicators reflecting effectiveness in consideration/support of technical needs, overall system functioning, etc.) or Focus groups | X | X | X |
| Prioritize limited resources across LLC functions | Periodic assessment of LLC functions conducted (Y/N) | All | System analysis + Leader interview | X | X | X |
| | Use of assessment results to determine priorities and allocate resources to LLC functions (Y/N) | All | System analysis + Leader interview | X | X | X |
| Initiate/organize the development of SOPs for leveraging the capabilities of system components | Organized SOP development process initiated (Y/N) | Leader education, MOSQ instruction (resident, non-resident, and simulation-supported, and AOT format) | System analysis + Leader interview | X | X | X |
| **Output: 24/7, Uniform Access**<br>**Metrics answer the question: Does the LLC really provide 24/7, uniform access, and is the intended audience using it as expected?**<br>**So what?: The LLC cannot achieve its stated outcomes unless it is available and being used.** | | | | | | |
| 24/7 Access to System – System Availability | # and average duration of technical outages (altogether and broken down by component application) | All | System analysis - Coordination with technical staff | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| 24/7 Access to System – System Availability | % operational time spent in technical outages or otherwise down (altogether and broken down by component application) | All | System analysis - Coordination with technical staff | X | X | X |
| | User perceptions of accessibility (altogether and broken down by component application) | All | User survey or Focus groups | X | X | X |
| 24/7 Access – Actual System Usage | Pattern of access as a function of time of day (horizontal vs. bi-modal vs. some other distribution) | All | System analysis - Coordination with technical staff | X | X | X |
| | Frequency of access to system during normal business hours vs. off-hours | All | System analysis - Coordination with technical staff | X | X | X |
| | % users reporting more than minor difficulty accessing the system (broken down by LLC component and location type) | All | User survey (1 question asking users to rate system accessibility) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Uniform Access to System and Training Content | % users from each applicable location (schoolhouse, satellite locations, TASS region sites, and home/deployed; the ideal balance at any one time is representative of the population) | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident), Simulation downloads | System analysis (coordination with technical staff) + Archival data (e.g., SIDPERS, to get population data) | X | X | X |
| | % curriculum materials found in Bb that are common across user locations (schoolhouse, satellite locations, TASS region sites, and home/deployed) | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident), Simulation downloads | Archival data (programs of instruction and course crosswalks) + System analysis - Coordination with technical staff ("common" materials need not match exactly, but must enable students to meet the same learning objectives) | X | X | X |
| | Equivalence of learning experience across resident and non-resident learners (includes content and instructional strategy equivalence) | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident), Simulation downloads | System analysis + Archival data (programs of instruction and course crosswalks) + Focus groups and/or Interviews | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Uniform Access to System and Training Content | # of other course materials (e.g., instructor updates) available to resident students that are not present in the LLC (or domain-general components of the LLC) and therefore not available to people at other locations | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident), Simulation downloads | Archival data (programs of instruction and course crosswalks) + System analysis - Coordination with technical staff (requires access to all sections, teams, etc. of a particular course at all applicable locations) | X | X | X |
| Actual System Usage (General) | % intended target audience registered to use the system | All | Archival data analysis (SIDPERS) + System data analysis | X | X | X |
| | % of registered users actively using the system (as a whole and broken down by LLC component; "actively" defined as using the system as or more frequently than alternatives) | All | User survey (multiple questions corresponding to the different uses of the LLC, e.g., course instruction vs. knowledge acquisition vs. training) or Focus groups | X | X | X |
| | User perceptions of usability and utility (altogether and broken down by LLC component) | All | User survey (2 questions, 1 each for usability and utility, per component) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Actual System Usage (Course Instruction Only) | % students who seek alternative means to get curriculum materials other than through the LLC (e.g., email attachments or thumb drives due to limitations in access) | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-assisted, and AOT format) | User survey (1 question - also a measure of active use) or Focus groups | X | X | X |
| | % students who access other components of the LLC (besides Bb or other intended portal) to conduct their studies or collaborate with peers or experts (captures breadth of use of the system) | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-assisted, and AOT format) | User survey (1+ questions - one for each relevant activity) or Focus groups | X | X | X |
| | % students who primarily access non-LLC resources to conduct their studies or collaborate with peers or experts | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-assisted, and AOT format) | User survey (1+ questions - also measures of active use) or Focus groups | X | X | X |
| Actual System Usage (Alternative Learning Only) | % registered non-students or former students who primarily seek alternative means to get knowledge or training other than through reaching back to the LLC | On-Demand Training, Discussion forums, Simulation downloads | User survey (1 question - also a measure of active use) or Focus groups + Coordination with technical staff (to identify non-students or former students) | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Actual System Usage (Alternative Learning Only) | % registered non-students or former students who use Bb or other components of the LLC to collaborate with course developers, instructors, and students | Discussion forums | User survey (1+ questions - one corresponding to each population) + Coordination with technical staff (to identify non-students or former students) | X | X | X |
| | % registered non-students or former students who access course curricula in the LLC to conduct reach-back studies | Leader education, MOSQ instruction | User survey (1 question) or Focus groups + Coordination with technical staff (to identify non-students or former students) | X | X | X |
| | % registered non-students or former students who access other components of the LLC (i.e., not course content) to conduct reach-back studies as or more often than alternatives | On-Demand Training, Discussion forums, Simulation downloads | User survey (1+ questions - also a measure of active use) or Focus groups + Coordination with technical staff (to identify non-students or former students) | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
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| **Output: CBT/WBT for delivering proponent courses**<br>**Metrics answer the question: Does the LLC really support the proponent's needs for CBT/WBT?**<br>**So what?: The LLC (MANSCEN only) cannot meet its objectives for learning effectiveness without providing CBT/WBT to the schoolhouse.** | | | | | | |
| Readily Available CBT/WBT to Meet Course Needs | % instructors and course managers who report being satisfied with the timing/ quality of the CBT/WBT courseware production/ modification/ validation process | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Instructor/Course manager survey (multiple questions relating to when updated course materials are received, whether the required course materials are available, the level of input allowed to the process, etc.) or Focus groups | | X | |
| | % instructors and course managers who report being satisfied with the usability and accessibility of the CBT/WBT produced, modified, validated, or overseen by the LLC courseware production team | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Instructor/Course manager survey (multiple questions relating to aspects of usability, accessibility, and instructional quality) or focus groups | | X | |
| | % students who report being satisfied with the usability and accessibility of the CBT/WBT produced, modified, validated, or overseen by the LLC courseware production team | Leader education (non-resident), MOSQ instruction (non-resident) | Student survey (multiple questions relating to aspects of usability and accessibility) or Focus groups | | X | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Readily Available CBT/WBT to Meet Course Needs | Ratio of trouble tickets and/or course interruptions resulting from CBT/WBT playability issues in DL XXI classrooms and DTFs for CBT/WBT developed and maintained or overseen by LLC courseware production team relative to CBT/WBT developed, maintained, and overseen by alternatives | Leader education (non-resident), MOSQ instruction (non-resident) | System analysis + Coordination with courseware production team | | X | |
| | Ratio of trouble tickets and/or course interruptions resulting from other shortfalls in CBT/WBT developed and maintained or overseen by courseware production team vs. CBT/WBT developed, maintained, and overseen by alternatives | Leader education (non-resident), MOSQ instruction (non-resident) | System analysis + Coordination with courseware production team + Course manager and/or instructor survey or Focus groups | | X | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Readily Available CBT/WBT to Meet Course Needs | % courses that have courseware to meet basic requirements (opposite metric = courseware backlog) | Leader education (non-resident), MOSQ instruction (non-resident) | Archival data (review of courseware requirements and planning documentation) + Course manager survey + Courseware production team survey or Focus groups | | X | |
| **External factor: Culture**<br>**Metrics answer the question: Does unit culture support anytime, anywhere learning?**<br>**So what?: The LLC cannot achieve its stated outcomes for individual and unit readiness unless unit commanders support the concept.** | | | | | | |
| Unit commander support of/emphasis on informal education | % non-resident students who indicate that their commanders support informal learning | Leader education (non-resident), MOSQ instruction (non-resident) | Student survey or Focus groups | X | X | X |
| | % registered users who indicate that their commanders support informal learning | Simulation downloads, On-Demand Training | User survey or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
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| **External factor: Resources**<br>**Metrics answer the question: Are external resources available to support anytime, anywhere learning?**<br>**So what?: The LLC cannot achieve its stated outcomes for individual learning and readiness, unit readiness, and enhanced throughput unless external resources support the process.** | | | | | | |
| Time available for learners to conduct studies in the context of other work | % students who report having sufficient time available to conduct studies outside of formal instructional settings (resident or non-resident) | Leader education (non-resident), MOSQ instruction (non-resident), Simulation downloads, On-Demand Training | Student survey or Focus groups | X | X | X |
| | % unit trainers who report that they have sufficient time to conduct informal training | Simulation downloads, On-Demand Training | User survey or Focus groups | | X | X |
| Fiscal incentives available for learners to conduct studies at home | % students who report receiving compensation for work-related study conducted outside of formal instructional settings (resident or non-resident) | Leader education (non-resident), MOSQ instruction (non-resident), Simulation downloads, On-Demand Training | Student survey or Focus groups | X | X | X |
| Technology and procedures available to track individual learners | Presence (Y/N) of personnel databases that can automatically track individuals, rather than MOSs or other generic identifiers | MOSQ instruction (AOT format) | System analysis or Interviews or Focus groups (at Human Resource Command and TRADOC level) | | | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Technology and procedures available to track individual learners | Presence (Y/N) of procedures for coordinating among proponent, Human Resources Command, and unit stakeholders for assigning individuals, rather than MOSs or other generic identifiers | MOSQ instruction (AOT format) | Interviews or Focus groups (at Human Resource Command and TRADOC level) | | | X |
| Contracting cycle | % instructors reporting that the contracting cycle for simulation updates keeps pace with equipment updates | Leader education (non-resident), MOSQ instruction (non-resident and simulation-supported), Simulation downloads | Instructor survey or Focus groups | X | X | X |
| Computing facilities | Availability (Y/N) of non-classroom computing resources for conducting studies at the schoolhouse (i.e., computer labs) | Leader education (resident), MOSQ instruction (resident) | Interviews or Focus groups (at the proponent level) | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
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| **External factor: Policies**<br>**Metrics answer the question: Are Army-level policies supportive of anytime, anywhere learning?**<br>**So what?: The LLC cannot achieve its stated unit and organizational outcomes without support from Army-level policies that enable anytime, anywhere learning.** | | | | | | |
| Army-level policy supporting anytime/anywhere learning | Presence (Y/N) of a human resources system that assigns individuals to units based on competency matches, rather than MOS (or some other generic indicator) matches | All | Interviews or Focus groups (at Human Resource Command and TRADOC level) | X | X | X |
| | Presence (Y/N) of a Total Army approach to authorizing training, such that approval and resourcing is based on content and procedures, rather than location or component | MOSQ instruction (resident and non-resident) | Interviews or Focus groups (at Human Resource Command and TRADOC level) | | X | X |
| Army-level policy supporting rapid course updates | % reduction in time required for proponent curriculum development, vetting, and revision process | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-assisted, and AOT format) | Interviews or Focus groups (at the proponent level) | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
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| **Outcome (Individual): Improved student performance**<br>**Metrics answer the question: Does the LLC enable higher-order thinking (where applicable), robust skill development, reflective capability, learner responsibility, learner self-efficacy, and learner motivation?**<br>**So what?: The technologies comprising the LLC are designed to revolutionize instruction such that it is learner-centered, which enhances student learning performance during and after a course. The aspects of improved student performance listed below in the metric categories capture the student behaviors of lifelong adult learners.** | | | | | | |
| Enhanced higher-order thinking | % students with "Application" or higher cognitive level attained on writing assignments (alone and relative to pre- or non-LLC conditions) | Leader education (resident and non-resident) | Observation using special purpose measure based on Bloom's (or other) taxonomy or Archival data (e.g., 1009 form - LVNW only), where possible | X | X | X |
| | % students with "Application" or higher cognitive level attained on presentations (alone and relative to pre- or non-LLC conditions) | Leader education (resident and non-resident) | Observation using special purpose measure based on Bloom's (or other) taxonomy or Archival data (e.g., 1009 form - LVNW only), where possible | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Enhanced higher-order thinking | % students with high participation quality scores in formal group activities; participation scores to include:<br>o Elements of reasoning (overall, average scores of 4-5)<br>o Intellectual standards (overall, average scores of 4-5)<br>o Cognitive level attained of "Application" or higher (alone and relative to pre- or non-LLC conditions) | Leader education (resident and non-resident) | Observation using special purpose measure based on Bloom's (or other) taxonomy or Archival data (e.g., 1009 form - LVNW only), where possible | X | X | X |
| | % students demonstrating "Application" or higher individual levels of competency during classroom group practical exercises or capstone exercises (alone or relative to pre- or non-LLC conditions) | Leader education (resident and non-resident) | Observation using special purpose measure based on Bloom's (or other) taxonomy or Archival data (e.g., 1009 form - LVNW only), where possible | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Enhanced higher-order thinking | % student groups demonstrating effective team/collaboration skills during group practical exercises or capstone exercises (alone or relative to pre-or non-LLC conditions | Leader education (resident and non-resident) | Observation using special purpose measure or Archival data (e.g., 1009 form - LVNW only), where possible | X | X | X |
| Enhanced skill development | % students demonstrating "Mechanism" or higher level of motor capability on individual tasks (alone and relative to pre- or non-LLC conditions) | MOSQ instruction (resident, non-resident, simulation-supported, and AOT format), Simulation downloads, On-Demand Training | Observation using special purpose measure based on Bloom's taxonomy or Unit trainer survey or interview | | X | X |
| | Unit trainer perceptions of skill development relative to pre-LLC or non-LLC conditions | MOSQ instruction (resident, non-resident, simulation-supported, and AOT format), Simulation downloads, On-Demand Training | Special purpose measure (Rater observations of classroom practical exercises/capstone exercises) | | X | X |
| Enhanced reflective capability | % students demonstrating ability to generate thoughtful, reflective questions about course topics or professional area of expertise (alone or relative to pre- or non-LLC conditions | Leader education (resident and non-resident) | Special purpose measure (fluency assessment) | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Enhanced responsibility for own learning | % students who used BCKS Leader Network to supplement course materials, complete assignments, or for own research | Leader education (resident and non-resident) | Student survey or Focus groups | X | | X |
| | % students who used other Army KM resources (including SMEs and other forums, simulation downloads, etc.) to supplement course materials, complete assignments, or for own research | Leader education (resident and non-resident), MOSQ instruction (non-resident) | Student survey or Focus groups | X | X | X |
| | % students who used non-Army resources (e.g., Google, Wikipedia, etc.) to supplement course materials, complete assignments, or for own research | Leader education (resident and non-resident) | Student survey or Focus groups | X | X | X |
| | % students who report accessing course materials in Bb to prepare for class | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-supported, and AOT format) | Student survey or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Enhanced responsibility for own learning | % students who access a particular Bb page (containing course materials) *prior* to when the corresponding class/lesson was held | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-supported, and AOT format) | System analysis + Student survey or Focus groups | X | X | X |
| | Ratio of # of times students access Bb during course to # of lessons in the course (i.e., are students accessing Bb more than the absolute minimum requirement to view/gather materials) | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-supported, and AOT format) | System analysis + Student survey or Focus groups | X | X | X |
| | Pattern of access to lesson materials in Bb over course duration (horizontal vs. negatively skewed distribution) | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-supported, and AOT format) | System analysis + Student survey or Focus groups | X | X | X |
| | % unit trainers who report that trainees take responsibility for reaching back to the proponent LLC to advance their knowledge and skill | All | External survey or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Enhanced responsibility for own learning | % users who report a sense of personal responsibility for their professional development and learning (alone and relative to pre- or non-LLC conditions | All | User survey or Focus groups | X | X | X |
| Enhanced learning self-efficacy | % users who report that they are capable of leading their own learning process (alone or relative to pre- or non-LLC conditions | All | User survey (composite of multiple indicators, including time, resource, technical, and social aspects) or Focus groups | X | X | X |
| Enhanced motivation to learn | % users who report that they were motivated to develop themselves professionally and advance their knowledge of their specialty area | All | User survey (composite of multiple indicators of engagement, enjoyment, etc.) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| **Outcome (Individual): Adoption of Lifelong Learning Orientation**<br>**Metrics answer the question: Does the LLC foster a lifelong learning orientation in its users?**<br>**So what?: Lifelong learning orientation is key to the continuous learning necessary for an adaptive force. One's intent to participate in lifelong learning is often determined by the requirement to learn (i.e., situational vs. personal characteristics). For this reason, users' perceptions of situational characteristics are a primary focus of some of these metrics.** | | | | | | |
| Distal Motivation to Engage in Lifelong Learning | % users who indicate that they intend to participate in further work-related formal and informal education and professional development that is not required (relative to pre- or non-LLC conditions) | All | User survey (single item, National average for formal ed = 59-62%; 76-77% informal) or Focus groups | X | X | X |
| | % users who report a high utility of maintaining or improving existing skills for achieving career benefits (i.e., the more I learn, the greater the payoff) (relative to pre- or non-LLC conditions) | All | User survey (single item) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Distal Motivation to Engage in Lifelong Learning | % users who report a high utility of participating in work-related education for maintaining or improving existing skills and achieving career benefits (relative to pre- or non-LLC conditions) | All | User survey (single item) or Focus groups | X | X | X |
| | % users who report that a high level of effort is required to achieve successful performance in distance-based, self-directed education (relative to pre- or non-LLC conditions) | All | User survey (single item) or Focus groups | X | X | X |
| | % users who indicate that they intend to counsel/have counseled peers and subordinates to participate in non-required education/ professional development (relative to pre- or non-LLC conditions) | All | User survey (single item) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Enhanced Collaboration Orientation | % users who indicate that they intend to participate/have participated in work-related education/ professional development as a volunteer (e.g., via forums) (relative to pre- or non-LLC conditions) | All | User survey (single item) or Focus groups | X | X | X |
| Internalization of Anytime/Anywhere Learning | % users who demonstrate broad thinking regarding sources of information for learning (relative to pre- or non-LLC conditions) | All | Special purpose measure (fluency assessment or situational judgment assessment) | X | X | X |
| | % users who demonstrate broad thinking regarding the location of learning environments (relative to pre- or non-LLC conditions) | All | Special purpose measure (fluency assessment or situational judgment assessment) | X | X | X |
| | % users who demonstrate broad thinking regarding sources of learning authority (relative to pre- or non-LLC conditions) | All | Special purpose measure (fluency assessment or situational judgment assessment) | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
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| **Outcome (Individual): Enhanced mission readiness**<br>**Metrics answer the question: Does the LLC enable enhanced performance outside of the formal educational setting?**<br>**So what?: Improvements in student or learner performance and characteristics should have an impact on how individuals perform in the field. If this connection is missing, examination of the hypothetical link between education and job performance is warranted.** | | | | | | |
| Just-in-time competency | % of users who report having received just-in-time knowledge, refresher training, or new skills training from the LLC | Simulation downloads, On-Demand Training. Discussion forums | User survey or Focus groups | | | X |
| | % of unit trainers who report that trainees received just-in-time knowledge, refresher training, or new skills training from the LLC | Simulation downloads, On-Demand Training. Discussion forums | External survey or Focus groups or Interviews | | | X |
| | % of graduates who report receiving timely MOSQ training from the LLC (increasing time available to unit, enabling presence for unit training, etc.) | MOSQ instruction (non-resident) | Student survey or Focus groups | | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Just-in-time competency | Estimated % reduction in time required to meet training requirements via LLC vs. traditional instruction (% reduction in course duration) | Leader education (non-resident), MOSQ instruction (non-resident, AOT format) | Archival data analysis | X | X | X |
| Enhanced skill retention | % unit trainers or commanders who report the ability to schedule less frequent individual skill refresher training due to enhanced initial proficiency | MOSQ instruction (resident, non-resident, simulation-supported, AOT format), Simulation downloads, On-Demand Training. Discussion forums | External survey or Focus groups or Interviews | | | X |
| | % unit trainers or commanders who report the ability to schedule less frequent individual skill refresher training due to anytime, anywhere learning | Simulation downloads, On-Demand Training. Discussion forums | External survey or Focus groups or Interviews | | | X |
| Enhanced organizational commitment (affective) | % users who report feeling that the LLCs reflect Army intent to support the warfighter | All | User survey (single item) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
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| Enhanced organizational commitment (affective) | % users who report feeling that using the LLCs made them feel like the Army had personally invested in their professional development | All | User survey (single item) or Focus groups | X | X | X |
| | % users who report feeling that the LLCs indicate that the Army is working hard to improve educational access/quality | All | User survey (single item) or Focus groups | X | X | X |
| | % users who report that the LLCs place the Army at the lead of professional education | All | User survey (single item) or Focus groups | X | X | X |
| | % users who report that using the LLCs enhanced their job/organizational satisfaction | All | User survey (single item) or Focus groups | X | X | X |
| Enhanced socialization in organizational goals and values | % users who report feeling that the (physical) LLC represents the goals and values of the organization, and that they feel they share these goals and values | All | User survey (single item) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
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| Enhanced socialization in organizational goals and values | % users who report feeling that the people they have encountered via the LLC represent the goals and values of the organization, and that they feel they share these goals and values | All | User survey (single item) or Focus groups | X | X | X |
| | % users who report that using the LLC for learning and collaboration has made them feel like a better fit to the organization | All | User survey (single item) or Focus groups | X | X | X |
| Reduced Work-Education-Family Conflict | % student users reporting education-related problems due to at-home education demands placed by the LLC (e.g., inability to complete assignments on time; low % is better) | Leader education (non-resident), MOSQ instruction (non-resident) | Student survey (single item) or Focus groups | X | X | X |
| | % student users reporting job-related problems due to at-home education demands placed by the LLC (e.g., fatigue, distraction, temper, etc.; low % is better) | Leader education (non-resident), MOSQ instruction (non-resident) | Student survey (single item) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
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| | % student users reporting lost duty time due to at-home education demands placed by the LLC (low % is better) | Leader education (non-resident), MOSQ instruction (non-resident) | Student survey (single item) or Focus groups | X | X | X |
| Reduced Work-Education-Family Conflict | % student users reporting family-related problems due to at-home education demands placed by the LLC (e.g., arguments with spouse or children; low % is better) | Leader education (non-resident), MOSQ instruction (non-resident) | Student survey (single item) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
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| **Outcome (Unit): Enhanced Mission Readiness**<br>**Metrics answer the question: Does the LLC have an impact on aspects of mission readiness that relate to personnel and training effectiveness, such as training status and unit status reporting?**<br>**So what?: Mission readiness represents a partial "bottom line" for LLCs. If LLCs enhance the learning environment and student performance, but there is no impact on the ability of units to conduct the activities (i.e., missions) that learning and performance support, then relatively little impact can be achieved by the initiative. Training status and unit status reporting were a focus because these aspects of mission readiness are well defined and have a clear link to LLC goals. Other aspects of readiness, such as unit performance at CTCs, are multiply determined and so do not make good metrics, especially when a quasi-experimental design cannot be used.** | | | | | | |
| Reduced Time to Optimal Training Status | % reduction of average time in training "holding status" | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, and AOT format) | Archival data – ATRRS and/or ESORTS | X | X | X |
| | Estimated days to complete coursework as a resident in training (including travel, registration, etc.)/Actual time to complete course as a non-resident in training | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, and AOT format) | Archival data – Coordination with proponent course managers | X | X | X |
| Enhanced Unit Status Reporting | % increase in average MOSQ percentage contained in USRs | MOSQ instruction (resident and non-resident) | Archival data - GSORTS/ESORTS | | X | X |
| | % reduction in "not-P-1" USR reason codes for "MOS Imbalances," "Not MOS Qualified," and "Not MOS qualified—awaiting training" | MOSQ instruction (resident and non-resident) | Archival data - GSORTS/ESORTS | | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
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| Enhanced Unit Status Reporting | % reduction in "not-T-1" USR reason codes for "MOS imbalances," "Shortage-qualified officers," and "Squad/crew qualification low" | MOSQ instruction (resident and non-resident) | Archival data - GSORTS/ESORTS | | X | X |
| Enhanced MOSQ Training Status | % increase in proportion of drilling reservists who are duty MOSQ | MOSQ instruction (resident and non-resident) | Archival data - SIDPERS | | X | X |
| | % decrease in non-DMOSQ enlisted reservists/guard who are duty skill level between 2 and 5 | MOSQ instruction (resident and non-resident) | Archival data - SIDPERS | | X | X |
| | % reduction in proportion of enlisted reservists/guard promoted without having taken the NCOES or OES course required for their grade | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Archival data - SIDPERS | X | X | X |
| | % reduction in proportion of reserve/guard E-5s, E-6s, and E-7s who need NCOES courses | MOSQ instruction (resident and non-resident) | Archival data - SIDPERS | | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Enhanced collective training | % unit trainers who report that collective training was more effective because individual skills were better developed due to anytime/anywhere learning | All | External survey or Focus groups or Interviews | X | X | X |
| **Outcome (Organization): Improved teaching and learning environment**<br>**Metrics answer the question: Does the LLC provide up-to-date, relevant course content, advanced instructional materials, greater classroom efficiency, instructors who facilitate adult lifelong learning, and a community of lifelong learners?**<br>**So what?: Blended learning solutions such as an LLC have the capacity to enable rapid information sharing and automation of administrative tasks that take away from classroom learning time. They also enable access to/delivery of interactive multimedia instruction. For a blended learning solution to have an impact greater than traditional solutions, instructor performance must change to support learner-centered instruction. This supports the development of learning communities, which are one characteristic of lifelong learning.** | | | | | | |
| Enhanced Relevance of Training and Educational Content | Estimated frequency of instructor augmentation to standardized course curriculum relative to pre-LLC situations | Leader education (resident and non-resident) | Instructor survey (single item) or Focus groups | X | X | X |
| | % of users reporting that they could not have achieved learning any other way (than on the job) by using the LLC | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-supported, and AOT format) | User survey or Interviews or Focus groups | | | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Enhanced Relevance of Training and Educational Content | Unit commander/ training supervisor perceptions of course relevance | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-supported, and AOT format), On-Demand Training | External survey or Interviews or Focus groups | X | X | X |
| | Instructor perceptions of course relevance | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-supported, and AOT format), On-Demand Training | Instructor survey (including question on accessibility of FOUO content, where applicable) or Focus groups | X | X | X |
| | Student perceptions of course relevance | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-supported, and AOT format), On-Demand Training | Student survey (including question on accessibility of FOUO content, where applicable) or Focus groups | X | X | X |
| | % coverage of critical training needs addressed by LLC content | All | System analysis + Task analysis | X | X | X |
| | % courses with virtual "field trips," discussing class topics with SMEs, or attending lectures via VTC (especially involving people currently in the field or recently returned) | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-supported, and AOT format) | System analysis + Instructor survey or Focus groups | X | X | X |
| | % of required equipment or other training simulations provided by the LLC | Simulation downloads | System analysis + Task analysis | | | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Enhanced Relevance of Training and Educational Content | % users who report that they have found relevant, useful courses, courseware, or training materials via the LLC | All | User survey (multiple items each relating to an aspect of content delivered via the LLC) Interviews or Focus groups | X | X | X |
| Enhanced Instructional Efficiency | Estimated % reduction in time spent in classroom doing administrative tasks, including announcements, handouts, and testing (estimated, and where applicable) using LLC | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Instructor survey (multiple questions, one for each administrative item) or Focus groups | X | X | X |
| | Estimated % increase in time available to assist students having difficulties | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Instructor survey (single item) or Focus groups | X | X | X |
| | % instructors who report using increased class time to enhance instruction | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Instructor survey (single item) or Focus groups | X | X | X |
| | % instructors who report using increased class time to remediate problem students | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Instructor survey (single item) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Enhanced Instructional Efficiency | Ratio of time spent on CBT/WBT courseware production (analysis/ design/ development/ implementation) using LLC courseware developers vs. outside contractors (value < 1 indicates a time savings using LLC courseware production process) | Leader education (non-resident), MOSQ instruction (non-resident) | Archival data (hours records, contractor invoices, etc.) + Courseware developer interview + Contractor interview (Note, comparisons must be made using courseware of roughly equivalent length and interactivity) | | X | |
| Instructor as facilitator of adult learning | Quality of real-time instructor facilitation behaviors during synchronous instruction (co-located or distributed) | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Student survey (multiple indicators to include providing clear guidance on expectations and evaluation criteria, providing positive and informative feedback, providing challenges to students without overwhelming them, assigning tasks and roles within group tasks, facilitating analysis and reflection through questioning) + Classroom observation w/ rater checklist, to include the same indicators as listed above | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Instructor as facilitator of adult learning | Quality of computer-based "instructor" facilitation behaviors in individual CBT/WBT | Leader education (non-resident), MOSQ instruction (non-resident), Simulation downloads | Student survey (multiple indicators, as above, except applied to the structure and interactivity of the CBT/WBT) + System analysis – observer ratings of CBT/WBT using the above criteria | | X | |
| | Quality of instructor facilitation behaviors during asynchronous instruction | Leader education (non-resident), MOSQ instruction (non-resident) | Student survey (multiple indicators, as above, to real-time instructor facilitation) + System analysis – observer ratings of the organization and explanation of postings, use of asynchronous space to conduct administrative tasks (including assessment and group assignments), cognitively buttress lessons, and facilitate a positive environment/socialization | X | X | X |
| | % students reporting that they were encouraged to contribute materials to course curriculum | Leader education (resident and non-resident) | Student survey + Instructor survey (single item) or Focus groups | X | | |
| | % students reporting that instructors encouraged them (or demonstrated how) to use resources other than him/herself (including SMEs and other students) for class work or other purposes | Leader education (resident and non-resident) | Student survey (single item) or Focus groups | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Presence of learning community | % students reporting a sense of commitment to and among classmates to share information, provide task support, and to provide social/emotional support (reference criterion depends on class size) | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Student survey (multiple items, one for each type of helping behavior) or Focus groups | X | X | X |
| | % students engaging each other in discussion of course-related or other topics outside of the classroom – w/ and w/o instructor | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Student survey (multiple items related to different types of discussion) or Focus groups + System analysis | X | X | X |
| | Presence (Y/N) of a student leader who collaboratively organizes student efforts (due date lists, class calendar, etc.) | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Student survey (single item) or Focus groups + System analysis | X | X | |
| | % students reporting freedom to participate in classroom (traditional or virtual) activity | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Student survey (to include items on conversation dominance, openness of instructor, feelings of trust in constructive criticism) or Focus groups | X | X | X |
| | % students engaging in discussion of course topics inside the classroom (traditional or virtual) – w/ and w/o instructor | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Classroom observation (summarization of 1009 forms, where applicable) | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Presence of learning community | % students reporting a sense of having been through a shared experience with classmates | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Student survey (to include items on feelings of camaraderie and interpersonal connection) or Focus groups | X | X | X |
| | % students reporting intent to keep (or having kept) in touch with classmates after course is over | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Student survey (to include items on social and professional reasons for contact) or Focus groups | X | X | X |
| | % users who report feeling that they are part of a larger community of professionals who support each others' development | All | User survey or Interviews or Focus groups | X | X | X |
| | % of posts that contain referrals (to self or others) for additional information or expertise | Discussion forums | System analysis | | | X |
| | % users with basic biographical information viewable by others | Discussion forums | System analysis | | | X |
| | Presence of "built" opportunities to participate in shared experiences | Discussion forums | System analysis | | | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Presence of learning community | % of knowledge contributions (i.e., downloads) made by target members (as opposed to facilitators) | Discussion forums | System analysis | | | X |
| | % of knowledge contributions (i.e., downloads) with contextualizing descriptions | Discussion forums | System analysis | | | X |
| | % of discussion contributions made by target members (as opposed to facilitators) | Discussion forums | System analysis | | | X |
| | % of initial posts followed by a meaningful response within 24 hours (i.e., not just an acknowledgement) | Discussion forums | System analysis | | | X |
| | % of conversation threads whose posts contain references to one another | Discussion forums | System analysis | | | X |
| | % of incidents of unprofessional commentary | Discussion forums | System analysis | | | X |
| Advanced CBT/WBT courseware for distributed/distance learning | % of courseware content that is SCORM conformant | Leader education (non-resident), MOSQ instruction (non-resident) | Archival data (records of ATSC approval of SCORM conformance -- may require coordination with outside contractors developing courseware) | | X | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Advanced CBT/WBT courseware for distributed/distance learning | % of courseware modules comprised of instructional strategies/levels of interactivity that are appropriate to lesson content | Leader education (non-resident), MOSQ instruction (non-resident) | System analysis - observer ratings of courseware based on best practice in instructional design (to include levels of interactivity, assessment, feedback, scaffolding, collaborative learning, support of social interaction, etc.) | | X | |
| | % of educational/ training requirements that involve collective/team skills that are taught using a synchronous collaborative learning environment (including virtual classmates/ teammates) | Leader education (non-resident), MOSQ instruction (non-resident) | System analysis + Coordination with course managers | | X | |
| | Quality ratings for CBT/WBT produced or overseen by LLC courseware production team (relative to criterion) | Leader education (non-resident), MOSQ instruction (non-resident) | Special purpose measure (summary measure of observer ratings of courseware based on best practice, see above metric) | | X | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Advanced CBT/WBT courseware for distributed/distance learning | Ratio of quality ratings for CBT/WBT produced or overseen by LLC courseware production team relative to CBT/WBT not produced or overseen by LLC courseware production team (where applicable, comparison could be across LLCs) | Leader education (non-resident), MOSQ instruction (non-resident) | Special purpose measure (comparison of summary measures of observer ratings of courseware based on best practice, see above metric) | | X | |
| **Outcome (Organizational): Cost-Effectiveness**<br>**Metrics answer the question: Does the LLC enable more training at a better cost than traditional alternatives?**<br>**So what?: Web-based blended learning solutions are critical enablers of broadening the student base, which reduces cost/time per student. If this is not achieved, something has gone wrong with the initiative.** | | | | | | |
| Cost savings | Cost per student with LLC versus prior to LLC implementation | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-assisted, AOT format), On-Demand Training | Archival data (cost data -- see resource metrics) | X | X | X |
| | % reduction in travel, housing, and student pay expenses (relative to total cost of training) | Leader education (non-resident), MOSQ instruction (non-resident) | Archival data (cost data -- see resource metrics) | X | X | X |
| | % reduction in printing and reproduction costs (relative to total cost of training) | Leader education (resident and non-resident), MOSQ instruction (resident and non-resident) | Archival data (cost data -- see resource metrics) | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Cost savings | % reduction in printing and reproduction, travel, and instructor pay costs (relative to total cost of training) | On-Demand Training | Archival data (cost data -- see resource metrics) | | | X |
| | % increase in # of classes offered (of a particular course, assuming no or minimal associated cost increase) | Leader education (resident and non-resident), MOSQ instruction (resident, non-resident, simulation-assisted, AOT format), On-Demand Training | Archival data - ATRRS | X | X | X |
| Throughput Effectiveness | Ratio of graduates ("seated" and "seatless") to training quotas (should be at least >.80 - estimates how well LLC gets around the issue of limited seats and incomplete seat reservations; greater than 1 is ideal because more need training than are captured in the training quota) | Leader education (non-resident), MOSQ instruction (non-resident) | Archival data - ATRRS | X | X | X |
| | Ratio of "seatless" students to "seated" students before and after LLC implementation | Leader education (non-resident), MOSQ instruction (non-resident) | System analysis + ATRRS | X | X | X |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Throughput Effectiveness | % increase in enrollment and graduation before and after LLC implementation | Leader education (non-resident), MOSQ instruction (non-resident, simulation-assisted, AOT format) | Archival data - ATRRS | X | X | X |
| Reduced Recycle Rate | % decrease in recycle rates relative to pre- or non-LLC conditions | MOSQ instruction (resident AIT) | Archival data - ATRRS | | X | X |
| CBT/WBT Courseware Development Cost Effectiveness | Ratio of dollars spent on CBT/WBT courseware production (analysis/ design/ development/ implementation) using LLC courseware developers vs. outside contractors (value < 1 indicates a time savings using LLC courseware production process) | Leader education (non-resident), MOSQ instruction (non-resident) | Archival data (hours x labor records, contractor invoices, etc.) + Courseware developer interview + Contractor interview (Note, comparisons must be made using courseware of roughly equivalent length and interactivity) | | X | |

| Metric Category | Metric | Applicable To | Data Collection | LVNW | MANSCEN | LWN |
|---|---|---|---|---|---|---|
| Decreased range equipment/supplies requirements | Ratio of proponent range supplies (e.g., ammunition, fuel, etc.) used per exercise before and after LLC implementation (assumes that enhanced competency enabled by LLC will make performance more efficient during capstone field exercises for courses taught via the LLC) | MOSQ instruction (resident and non-resident) | Archival data + Coordination with range managers/directors | | X | X |
| | Ratio of proponent range or other equipment (e.g., digital systems) requirements before and after LLC implementation (assumes that use of simulated equipment in the LLC will reduce the need for actual equipment located at the schoolhouse) | MOSQ instruction (simulation-assisted) | Archival data + Coordination with range and equipment facilities managers/directors | | X | X |
| | % reduction in time spent on equipment | MOSQ instruction (simulation-assisted) | Archival data + Classroom observation | | X | X |